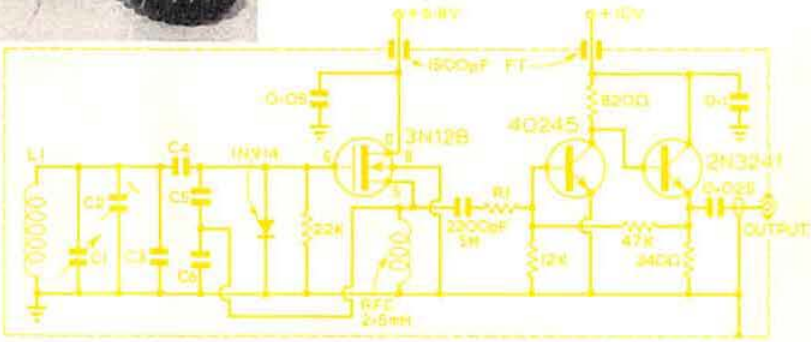
RSGB

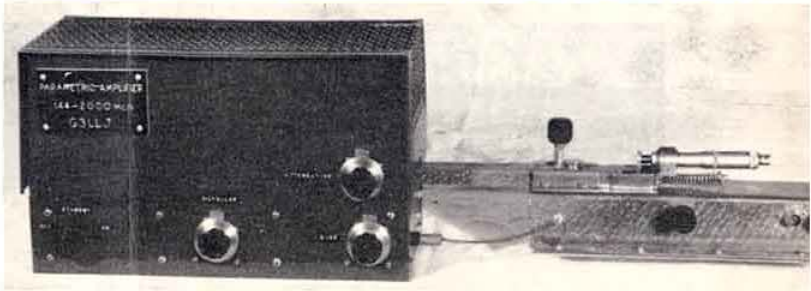
BULLETIN

MARCH 1967
VOL 43, No. 3

BCC 69 on 10m
see page 142



This **MOSFET V.F.O** is described in Technical Topics page



This Multiband Parametric Amplifier is described on page 140

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

KW 201 *High quality – low price*

AMATEUR BANDS COMMUNICATIONS RECEIVER

Manufactured by the Leading Supplier for Radio Amateurs

The KW 201 has been specifically designed for optimum performance on Single Sideband. 11 ranges give coverage in the amateur bands from 1.8 mc/s to 30 mc/s. A mechanical filter gives an I.F. selectivity of 3.1 kc/s at 6 db and 6 kc/s at 60 db. A 'Q' multiplier is available giving a variable range of 3.1 kc/s to 200 cycles selectivity.

£105 *basic*

additional extras if required 100 kc/s Crystal Calibrator £6.0.0. 'Q' Multiplier £8.10.0.

ALSO AVAILABLE

KW VANGUARD transmitter, 10-160 metres AM and CW **£73**

KW VESPA Transmitter, 10-160 metres SSB, AM and CW complete with AC PSU **£120**

KW600 Linear Amplifier—500w P.E.P. 572B tube built in power supply **£110**

Exclusive UK agents for DAVCO and HAMMARLUND equipment

Agents for Sommerkamp equipment, including the transistorized transceivers, Collins, Drake, (2c receivers available shortly.) Swan, Mosley, Hy-gain, CDR, Kokusai mechanical filters, Tokai walkie talkies.

Microphones, co-axial cable and all your amateur radio equipment always in stock.

KW 2000A Transceiver

180 watt P.E.P. operation on all amateur bands 10-160 metres, complete with AC power supply **£220.0.0** inclusive. 12v DC supply available.

KW ELECTRONICS Ltd.,

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Cables: KAYDUBLEW, Dartford

one switch .... to give you two mikes

The Philips P33 is a superb, professional microphone at a medium price, which provides cardioid or omni-directional characteristics — at the click of a switch.
The frequency response is 80 c/s to 15 Kc/s ±3db. It is flat over a wide range and remains flat in the low frequency range when used close up. In the cardioid mode sensitivity at the rear is 17db less than at the front. Impedance is 500 ohms.
The P33 is mounted in a quick-release holder and can instantly be used as a hand-held microphone complete with a detachable, twin screened cable 16 feet in length. In addition an anti-vibration mounting is available, preventing transmission of rumble from the stand.

Modern appearance coupled with high quality make the P33 a must for entertaining, recording and public address. Ask your dealer for details or contact:

PETO SCOTT
sound and vision

PETO SCOTT LIMITED
Addlestone Road, Weybridge, Surrey. Tel: Weybridge 45511

PETO SCOTT for Philips professional sound

CW PS17

RSGB BULLETIN

MARCH 1967
VOLUME 43 No. 3

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CLOSING DATES

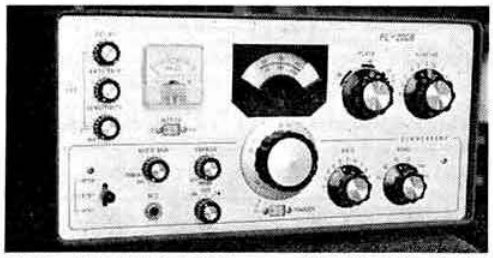
APRIL
10 MARCH

MAY
7 APRIL

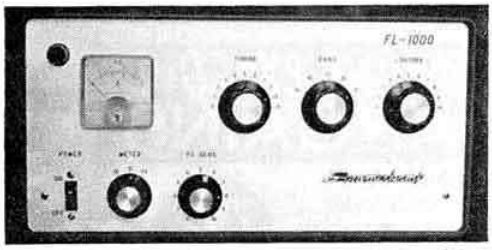
INDIVIDUAL COPIES 4/-.

SOMMERKAMP—*BEST VALUE FOR MONEY ON THE MARKET*

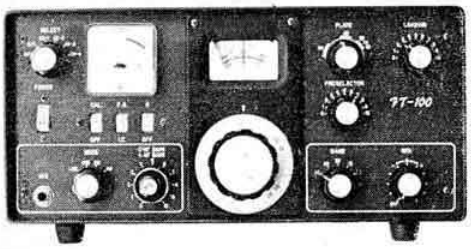
FR-100B Rx. 80-10, mechanical and crystal filters, 4, 2·1 & 0·5 kc/s. Better than ½ UV for 10db S/N. **£112.**



FL-200-B Tx. AM/CW/SSB. 240W p.e.p., 100W AM VOX, PTT, Break-in CW. Sidetone monitoring. Connectors for transceive with the FR-100-B supplied. Note:—The 6JS6A finals are the same electrically as the 6HF5 so the power ratings are *conservative*. **£130.**



FL-1000 Linear. 4-6JS6A's for a legal 400W p.e.p. Output. **£90.**



FT-100 Transceiver. 150W p.e.p. all transistor except driver and P.A. 13" × 6" × 10" deep. **£180.**

Full details on request.

Try me for odd valves—such odd ones as 6KE8 or 6GH8A that nobody except the manufacturer has heard of! A s.a.e. will get you stock lists which include lots of useful bits and pieces at low prices.

Postage—Please allow plenty, the excess will be refunded. Trade-ins and H.P. a pleasure (particularly to the Credit Company!)

SERVICE DEPARTMENT: Just as I thought, John is proving worth his weight in gold. Incidentally, I wouldn't mind betting that 95% of Rx's in use could be improved by meticulous alignment. In fact, I'll stick my neck out and say that if you bring your set along and we can't improve it—no charge! Fair enough?

Also in stock at time of going to press:

RECEIVERS—NEW

Lafayette HA350, HA55A aircraft receiver.

SECONDHAND

Eddystone 940—This would grace anyone's sideboard. Mint. ... £90. 0.0

CR150—Demonstrator. Don't get excited, it's the Junky Japanese, not the Mighty Marconi. £15. 0.0

888A—Mint £65. 0.0

680X—A1 ... ... £50. 0.0

KW76—A1 ... ... £20. 0.0

Redifon R50—A magnificent thing, but it nearly fills the shop! The owner wants £75 for it, but somebody please, please make an offer before it grows roots.

National NC121—Mint £30. 0.0

Hallicrafter S120—A1 ... ... £18. 0.0

Marconi CR150 double diversity with Marconi 1 kc/s and 2 kc/s filters. Will fit into an average ballroom quite nicely £35. 0.0

Eddystone 740—At £25 these must be good value.

Eddystone 840C—Mint. Magnificent looking even if the performance is only average. I always think of an 840C as biting into a large chocolate eclair and finding no cream inside! However, lots of people buy them at higher prices than mine, so who am I to argue £40. 0.0

Hammarlund SP600JX—Very, very few Rx's do I enthuse about, but this is one of them. I have a bunch of unmarked beauties at £95 each and worth every penny of it.

TRANSCEIVERS—NEW

NCX5 Mk. II, Swan 350, KW2000, Tokai 28·5 Mc/s walkie talkies £10.10.0—pretty much the same as any other, but maybe a bit better and a bit cheaper.

PW100. 10m transceiver, 8 channel crystal controlled 5 watt mobile rig. All transistor will fit into any car that has a 12 volt battery. Write for details. Complete with PTT mike. ... £50. 0.0

TRANSMITTERS:

KW500 Linear—A1... ... ... £50. 0.0

Tiger 100—A1—160-10 ... ... £45. 0.0

NEW—Codar AT5

Viceroy II—A good 'un. £85. 0.0

ODDS & ENDS:

Kyoritsu Grid Nip Meters—New £12.10.0

Bug Keys—New £4. 0.0

Electroniques Ham Band Coil Pack QP166 Mk. VI, new ... £12.10.0

Electronic Keyers—New £16.10.0

Hanson Transistor Checker—New £6. 0.0

Filters, Lafayette Mechanical £9.19.6

KVG 9 Mc/s crystal XF9A, 15 gns. XF9B, 19 gns.

Miniature Tubular Trimmers ½-5pF and 3-15pF 1/- each or 5 for 4/-. 1000pF feedthrough 6d. each, 5/- dozen.

N1500 neg. temp. 1pF. Stop drifting 6d. each, 5/- a dozen.

Disc ceramics 500 volt ·01 6d. each, 5/- a dozen
·0001 4d. each, 3/6 a dozen

LED SWR Indicators 50 and 75 ohm. £6.18.0

KW Match 75 ohm SWR Indicator £5. 0.0

Hook-up Wire. Brand new stranded 220 yds. ... ... 8/6 post free

Note: I usually carry a much larger stock than advertised, but there is not much point advertising something I know very well I can sell tomorrow. What a lot of the boys do is to drop me a line saying what they want—if I haven't got it, I keep my eyes and ears open and inform the chap concerned when I've got something. So, if you want a particular piece of gear, give me a yell!

Incidentally, I'm always interested in the more exotic stuff such as 51J's, 75A's, etc., and will guarantee to offer you a low, low price so that I can get fat on the profits! Anyone wanting such equipment at a high, high price—sing out.

P.S. One thing I've always wanted to know—you know those terminals at the back where you connect the speaker? Why do they make the screw conical so that no matter what you do, the wire is squeezed out! 'Tis a fiendish plot, I tell 'ee.

J. B. LOWE

51 WELLINGTON STREET, MATLOCK, DERBYS.

Telephone No. MATLOCK 2817 (or 2430 after 6 p.m.)

73 de Bill. VE8DP/G3UBO

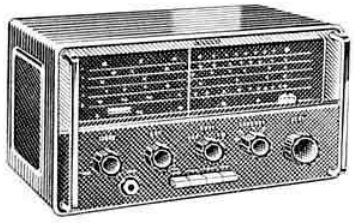
Eddystone EA 12

Amateur communication receiver

An amateur bands double-conversion superheterodyne receiver, for a.m, c.w, and s.s.b reception. For all amateur channels between 1.8 MHz and 30 MHz in nine 600 kHz bands with 28 MHz to 30 MHz in four bands.

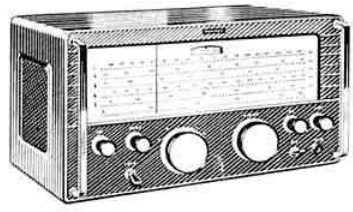
Primary features. Crystal controlled 1st oscillator, 2nd oscillator with continuously variable selectivity to 50 Hz, muting switched or by external relay, twin noise limiters, for a.m/c.w, and s.s.b, short-term drift better than 20 Hz and less than 100 Hz in any one hour, 'S' meter calibrated in nine levels of 6 dB and dB levels beyond 'S9,' two a.g.c time constants, deep slot filter, independent r.f, i.f, and audio gain controls with outputs for f.s.k and panoramic adaptor. **£185.**

OTHER RECEIVERS IN THE FAMOUS EDDYSTONE RANGE



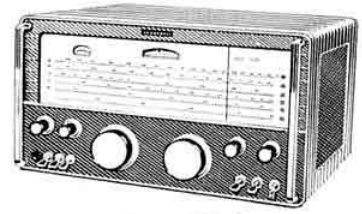
EC10 communications receiver

The fully transistorized EC10 communications receiver, supreme in its class, covers both medium wave broadcasting and all shortwave service to 30 MHz. Incorporating the famous Eddystone tuning drive, with logging scale and auxiliary vernier, shortwave reception is particularly simple. Battery operated or from optional a.c mains unit. **£48.**



840C A.C or D.C communications receiver

An 8-valve receiver with gap free coverage from 600 to 10 metres providing excellent reception of broadcast programmes and all major s.w channels including marine and international distress frequencies. The famous Eddystone extended band spread and logging scale is an essential feature. Suitable for a wide range of a.c and d.c voltages. Fully tropicalized. **£66.**



940 13-valve high sensitivity receiver

A superb high performance receiver incorporating two r.f and two i.f stages, push-pull output and silicon diode noise limiter circuit. Gap free coverage from 480 kHz and suitable for reception of c.w, a.m, and s.s.b modes. Exceptional sensitivity and stability. Built to professional standards for the serious listener. **£133.**

Comprehensive information from your Eddystone distributor or from: Eddystone Radio Limited, Eddystone Works, Alvechurch Road, Birmingham 31. Telephone Priory 2231. Telex 33708

A MARCONI COMPANY

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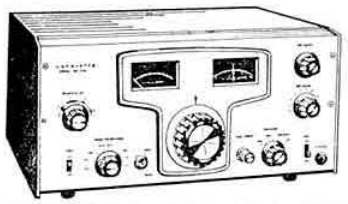
LAFAYETTE 10-80 Metre SSB/AM/CW Amateur Receiver



75GNS.

EXTRAS
100 kc/s xtal 35/-
Speaker Mate 55/-

5 HAM BANDS PLUS WWV
3·5– 4·0 Mc/s
7·0– 7·5 Mc/s
14·0–14·5 Mc/s
21·0–21·5 Mc/s
28·0–29·7 Mc/s
WWV at 15 Mc/s

- Mechanical Filter for Exceptional Selectivity
- 12 Valves Dual Conversion
- Automatic Noise Limiter
- Product Detector for Selectable Upper and Lower Sideband Reception
- Complete with Crystals for 80, 40, 20, 15 and 10 Metres
- 100 kc/s Crystal Calibrator and Crystal BFO
- "S" Meter-Calibrated in "S" Units 1-9 and to +40 db

MODEL HA.350 Lafayette's newest and most advanced communications receiver. Dual conversion circuitry features an image and IF rejection of more than 40 db. A product detector, providing selectable upper or lower sideband, solves the problems in SSB reception. Tuneable preselector circuit gives sensitivity of less than 1 microvolt for 10 db signal-to-noise ratio. Selectivity: Bandwidth of 2 kc/s at 6 db down and 6 kc/s at 60 db down using mechanical filter. Front panel 100 kc/s crystal calibrator reset control used in conjunction with the 15 Mc/s WWV station assures accurate calibration. CHECK THESE SPECIFICATIONS. Audio output: 1-watt maximum. Speaker impedance: 8; 500 ohms (speaker not supplied). Front panel controls: Preselector; Cal—On/off: Band Selector; Receive/Send; Tuning Cal Reset; Function—Off/AM/SSB1-CW/SSB2; RF gain; AF gain; ANL; Phone jack. Valves: 6BZ6—RF amp; 6BL8—Xtal controlled 1st mixer; 6BE6—2nd mixer; 6BA6—VFO, 6BA6—1M amp.; 6BA6—1F amp; 6AL5—AVC rectifier and AM noise limiter; 6AQ8—product detector and crystal calibrator; 6AV6—1st audio amplifier; 6AQ5—audio output; 6BA6—BFO; OB2—regulator. Silicon Full Wave rectifier. Size: 15in. wide by 7¼in. high by 10in. deep. For 230v. 50/60 cps AC. Wt., 25 lb. Less Calibrator Crystal.

IMMEDIATE DELIVERY **PART EXCHANGES**

LAFAYETTE KT340 COMMUNICATION RECEIVER SEMI-KIT

Build this wonderful receiver and save pounds. Supplied semi completed, main components ready mounted, RF section already wired and aligned. Full and precise instructions supplied. Specification: 8 valves + rectifier, 4 bands covering 550 kc/s–30 Mc/s. Incorporates 1 RF and 2 IF stages, "Q" multiplier, BFO, ANL, "S" meter, bandspread, aerial trimmer etc. Operation 115/230v. AC.

Price **25 GNS.** carr. 10/-.

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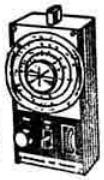
LAFAYETTE NUVISTOR GRID DIP METER (*as illustrated*)

Compact true one hand operation. Frequency range 1·7-180 Mc/s. 230v. AC operation. Supplied complete with all coils and instructions. **£12.10.0.** Carr. 5/-

KYORITSU GRID DIP METER



Hand held. 220/240v. AC. 360 kc/s-220 Mc/s. **£12.10.0** P & P 3/6.

TRANSISTORISED GRID DIP METER 9v. DC. 440 kc/s-280 Mc/s **£11.11.0.** P & P 3/6

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200 P.I.V. 200 mA	2/6
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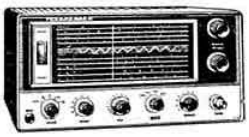
1,000v. P.I.V. 650 mA	7/6
800v. P.I.V. 500 mA	5/6
400v. P.I.V. 500 mA	3/6
800v. P.I.V. 5 amp	7/6
70v. P.I.V. 1 amp.	3/6
150v. P.I.V. 165 mA	1/-
700v. P.I.V. 100 amp	49/6

Discounts for quantities. Post extra.

NEW LAFAYETTE MODEL HA-700 AM/CW/SSB AMATEUR COMMUNICATION RECEIVER



8 valves, 5 bands incorporating 2 MECHANICAL FILTERS for exceptional selectivity and sensitivity. Frequency coverage on 5 bands 150-400 kc/s, 550-1600 kc/s, 1.6-4.0 Mc/s, 4.8-14.5 Mc/s, 10.5-30 Mc/s. Circuit incorporates R.F. stage, aerial trimmer, noise limiter, B.F.O., product detector, electrical bandspread, S meter, slide rule dial. Output for phones, low to 2KΩ, or speaker 4 or 8 ohms. Operation 220/240 volt AC. Size 7¾" × 15" × 10". Supplied brand new and guaranteed with handbook 36 Gns. carr. 10/-. SAE for leaflet.

HAMMARLUND SP.600JX RECEIVERS

Dual conversion 540 kc/s-54 Mc/s. Few left only. In excellent condition at £100.

R.107 RECEIVERS

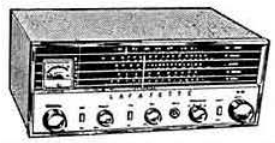
Coverage 1.7-17.5 Mc/s. Operation 12v DC/230v AC. Built-in Speaker, BFO, vernier dial, etc. Ideal set for beginners. Supplied fully tested and checked £15. Carr. 30/-.

CLEAR PLASTIC PANEL METERS.

First grade quality, Moving Coil panel meters, available ex-stock. SAE for illustrated leaflet. Discounts for quantity. Available as follows. Type MR. 38P. 1 21/23in. square fronts.

				100mA .. 22/6	20V DC .. 22/6
				150mA .. 22/6	50V DC .. 22/6
				200mA .. 22/6	100V DC .. 22/6
				200mA .. 22/6	150V DC .. 22/6
				300mA .. 22/6	300V DC .. 22/6
				500mA .. 22/6	500V DC .. 22/6
"S" Meter	29/6	500-0-500μA	29/6	750mA .. 22/6	15V AC .. 22/6
50μA ..	32/6	1mA ..	22/6	1-0-1mA .. 22/6	50V AC .. 22/6
100μA ..	29/6	2mA ..	22/6	1A DC .. 22/6	150V AC .. 22/6
200μA ..	27/6	5mA ..	22/6	2A DC .. 22/6	300V AC .. 22/6
500μA ..	25/-	10mA ..	22/6	5A DC .. 22/6	500V AC .. 22/6
50-0-50μA	29/6	20mA ..	22/6	3V DC .. 22/6	"S" Meter
100-0-100μA	27/6	50mA ..	22/6	10V DC .. 22/6	1mA .. 29/6

POST EXTRA Larger sizes available—send for lists.

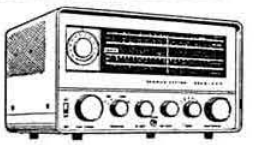


HAM-I 4 BAND COMMUNICATION RECEIVER

4 wavebands covering 535 kc/s–30 Mc/s. 5 valve superhet circuit. Incorporates S meter, BFO, BAND-SPREAD TUNING, BUILT IN 4in. SPEAKER, FERRITE AERIAL AND EXTERNAL TELESCOPIC AERIAL. Operation 220/250v. AC. Supplied brand new with handbook. **£16.16.0.** Carr. 10/-.

LAFAYETTE HA-63A COMMUNICATION RECEIVER

Outstanding value. High-class receiver covering 550 kc/s—41 Mc/s. on 4 bands. Incorporates seven valves plus rectifier, RF stage, illuminated 'S' meter, 1·5μV sensitivity. Electrical bandspread on the 80/40/20/15 and 10 metre bands. Slide rule dial, aerial trimmer, B.F.O., noise limiter. Output for phones or speaker. Operates on 115/220/240V. A.C. Supplied brand new and guaranteed, with manual. **24 Gns.** Carr. 10/-.



R209 MK. II COMMUNICATION RECEIVER

11 valve high grade communication receiver suitable for tropical use. 1-20 Mc/s on 4 bands. AM/CW/FM operation. Incorporates precision vernier drive, B.F.O. Aerial trimmer, internal speaker and 12 v. D.C. internal power supply. Supplied in excellent condition, fully tested and checked. **£22/10/-.** Carr. 20/-.

STAR SR.600 AMATEUR COMMUNICATION RECEIVER

New crystal controlled triple conversion de luxe 80-10 metre band receiver. Extremely high sensitivity, selectivity and stability. Special features include 3 IF stages, crystal controlled oscillator, 4 section L/C filter, "S" meter, BFO-ANL, 100 kc/s crystal calibrator, etc. Supplied brand new and guaranteed. New Last Few! Special Price to Clear £80 each. SAE for full details.

LAFAYETTE V.H.F. RECEIVERS

HA-55A AIRCRAFT RECEIVERS, 108-136 Mc/s. 2 R.F. Stages. Built in speaker 115/230 v A.C. Wonderful value. **£19.7.6.** Carr. 10/-.

HA-52A F.M. RECEIVER. 152-174 Mc/s. Fully tuned R.F. stage and 3 I.F. stages. Built in speaker. 115/230 v. A.C. Wonderful value. **£20.** Carr. 10/-.

GROUND PLANE ANTENNA. Suitable for either of above receivers. 59/6 extra.

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3 and 34 LISLE STREET, LONDON, W.C.2

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INCORPORATED 1926

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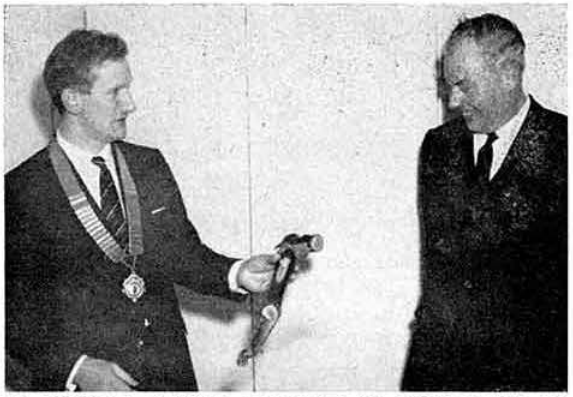
Region 8.—South Eastern.	D. N. T. Williams, G3MDO, Seletar, New House Lane, Thanington, Canterbury, Kent.
Region 9.—South Western.	R. E. Griffin, G5UH, 13 Alexandra Road, Uplands, Bristol 3.
Region 10.—South Wales.	C. H. Parsons, GW8NP, 90 Maesycoed Road, Heath, Cardiff, Glam.
Region 11.—North Wales.	M. Williams, GW3LCQ, "Dwyros," 12 Penrhos Avenue West, Llandudno Junction, Caerns.
Region 12.—North-East Scotland.	J. MacIntosh, GM3IAA, Broom Park, Cradlehall, Inverness.
Region 13.—South-East Scotland.	G. P. Millar, GM3UM, 8 Plewlands Gardens, Edinburgh 10.
Region 14.—West Scotland.	A. F. Hunter, GM3LTW, 4-5 Cassillis Road, Maybole, Ayrshire.
Region 15.—Northern Ireland.	L. M. Lyske, GI3CDF, 63 Church Street, Portadown, Co. Armagh.
Region 16.—East Anglia.	P. J. Naish, G3EIX, 6 Mildmays, Danbury, Chelmsford, Essex.
Region 17.—Southern.	L. Southwell, G3JLS, 15 Hollybank Road, Hythe, Southampton, Hants.

QSL BUREAU MANAGER

A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent



Mr Patterson, GI3KYP, presenting Mr. Stevens with the shillelagh.

Mr and Mrs Patterson receiving a cut-glass vase from EI2W (left)

The Installation of Mr A. D. Patterson as President, 1967

One hundred people applied for tickets for the Presidential Installation and social evening, few could not make it, and so the Faraday Room at the Kingsley Hotel on 17 January was pleasantly crowded to give GI3KYP an encouraging start to his forthcoming year of Presidential toil. After satisfying themselves with the appetizing selection of food and other sustinence, and having extricated themselves from involved technical arguments, the guests were called to order by the Past President, Mr R. F. Stevens, G2BVN. He did not delay in welcoming the gathering, and thanked them for showing an interest in the running of the Society. Casting a glance at Mr Patterson, GI3KYP, he went on to elucidate the problems and duties of a President of the Society. Mr Patterson duly replied, paying tribute to Mr Stevens' work through 1966, and then, to the amusement of the guests he presented Mr Stevens with an ornate shillelagh. No explanation was offered—this was left to everyone's imagination! Harry Wilson, EI2W, President of the Irish Radio Transmitters Society, was also present, and on behalf of the society's members presented Barney Patterson (who holds the call EI4BC) and his wife with an expensive cut-glass vase.

New Zonal Representative

Mr H. E. McNally, GI3SXG, has been invited by Council to fill the casual vacancy for Zone F, the position held by Mr Patterson, GI3KYP, prior to his election as President.

RSGB QSL BUREAU SUB-MANAGERS

The following is a list of the RSGB QSL Bureau Sub-Managers showing the call-sign groups for which they are responsible:

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G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
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G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex.
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G3SAA-TZZ:	E. G. Allen, G3DRN, 65A Melbury Gardens, London, SW20.
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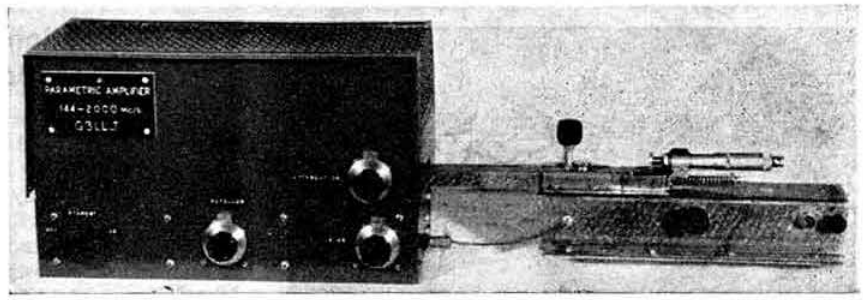
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.
DL2:	Cpl. C. Thomas, DL2CT, Box 125A, RAF Butzweilerhof, BFPO 19.

Cards must be sent to G2MI but envelopes may be sent to the appropriate Sub-Manager or to G2MI. Printed, gummed labels are obtainable from G2MI by sending an s.a.e.

Postage, letter rate: 2 oz. 4d., and 2d. for each additional 2 oz.

The address of the QSL Bureau Manager (Mr A. O. Milne, G2MI) is 29 Kechill Gardens, Bromley, Kent.



A Multi-Band Parametric Amplifier

By A. HODGKINSON, G3LLJ*

EVEN though transistors, and especially FETs, can claim remarkably low noise factors at u.h.f., the parametric amplifier can still hold its own in the face of this competition. Admittedly the improvement is becoming marginal, and equilibrium has been attained at 144 Mc/s, but the better u.h.f. noise factor is still worth having, to many amateurs, notably those perfectionists who will not rest until they have developed their equipment to the ultimate practical specification. These individuals, incidentally, come in two categories; either they are armchair theorists who can evolve a complete design from basic principles, or are purely practical in their approach and depend on the experiences of others. Thus, rather than attempt to steer a middle course and possibly bore one class or confuse the other, the writer has decided to restrict himself, in this article, to catering for the purely practical amateurs. The theory of parametric devices is consequently just barely covered.

A Multi-Band Parametric Amplifier—Specification

Akin to a superhet receiver, a parametric amplifier relies on a form of frequency changing for its operation. When changing frequency in the normal way, one can either use a tunable oscillator and a fixed i.f., or a fixed oscillator and variable i.f. In parametric practice, the oscillator is termed the pump oscillator or pump source, and the sum or difference frequency produced by mixing this pump frequency with signal frequency is known as the idler frequency.

It is generally accepted that the higher the pump oscillator frequency, the lower will be the noise output. A figure of six to seven times the signal frequency is suggested as a minimum, and therefore if operation from 144 to 1300 Mc/s is required, the pump range will have to extend from 864 to 7800 Mc/s, which is a fearsome task without considering the idler circuit. Admittedly this could be alleviated a little if 144 Mc/s facilities are dispensed with, as transistors can offer the same performance at this frequency. Alternatively, a fixed pump frequency of, say, 7800 Mc/s could be used, implying a varying idler within the range 7944 to 9100 Mc/s. In practice, a 10 Gc/s klystron would be used for convenience, producing either 10,144 to 11,300 Mc/s or 9856 to 8700 Mc/s depending on whether the sum or difference is chosen.

It should, of course, be appreciated that a half-wave signal tank will be required for each band; these are most conveniently designed to be detachable from the waveguide.

The basic design was inspired by an article in *QST* and the idler arrangements by the *Brit.IRE Journal*.

Components

The expensive parts of a parametric amplifier are the Varactor diode and attenuator; happily, the latter can be home produced, and can also be obtained on the surplus market, but no cheap substitute for the diode has been found. The writer resorted to a Microwave Associates MA450 and Ferranti ZC20C. Construction of the attenuator (Fig. 1) is from stiff card soaked in collodial graphite (obtainable from c.r.t. rebuilders), which after being dried, is doped with clear cellulose and mounted on the shaft by cementing between two shaft couplers.

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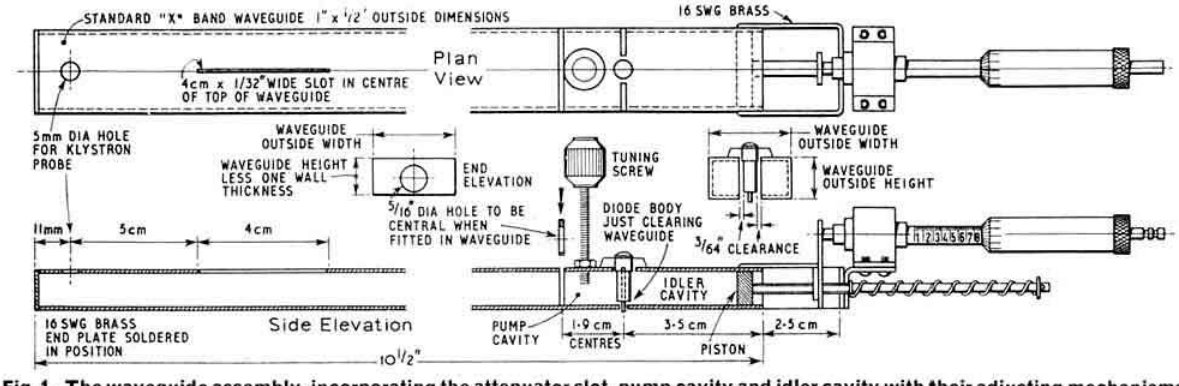
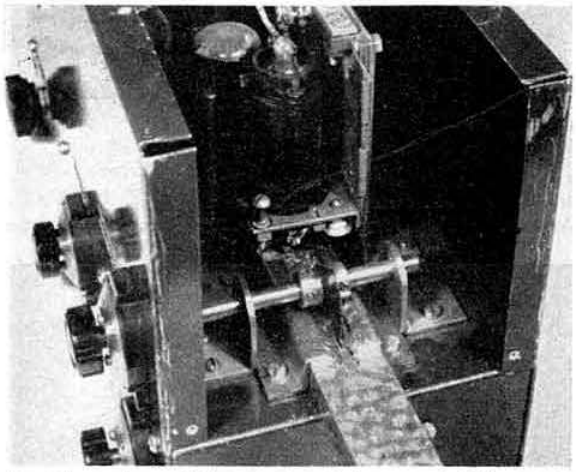


Fig. 1. The waveguide assembly, incorporating the attenuator slot, pump cavity and idler cavity with their adjusting mechanisms. The waveguide is standard WG16 (RG-52/U), with internal dimensions of 0·9 in. × 0·4 in., and external measurements of 1 in. × 0·5 in. This size is often stocked by wholesale non-ferrous metal merchants.

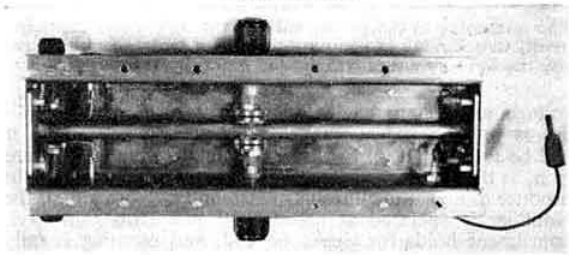
The klystron power supply chassis is a standard 12 in. × 5 in. × 2½ in. aluminium machine bent box with sides to prevent stray draughts effecting klystron stability. The waveguide is mounted solidly on to the power unit chassis as no movement is permissible. The klystron mount was removed from a surplus radar marker unit, but an alternative can be made by drilling out pin 4 of an international octal valveholder to clear klystron probe, and bending a suitable mount from ⅛ in. sheet metal. The metal probe of the klystron should be insulated with p.v.c. sleeving and the probe mounted with the metal parallel to the inside of the waveguide.

Machining the waveguide will possibly be the most difficult operation, and so a friendship with a first class engineer or toolmaker would be a definite asset. However, by carefully grinding a hacksaw blade to $\frac{1}{32}$ in. width and mounting the saw on a woodworker's guide the appropriate cuts can be made. Carefully remove burrs from the inside of the waveguide and taper file the edge of the outside so that solder can run and make a sound joint with the brass inserts which are cut and shaped from $\frac{1}{32}$ in. brass sheet.

The signal tanks (Fig. 2) present no particular problem, but it should be noted that the line carries the diode bias and is not in direct contact with the trough. The contact for the diode tip is made by removing the centre from a Belling-Lee coax socket. The waveguide is positioned and firmly clamped to the top of the appropriate signal tank, where again no mechanical movement is permissible. The writer's power-unit and troughs are rigidly screwed to a baseboard.



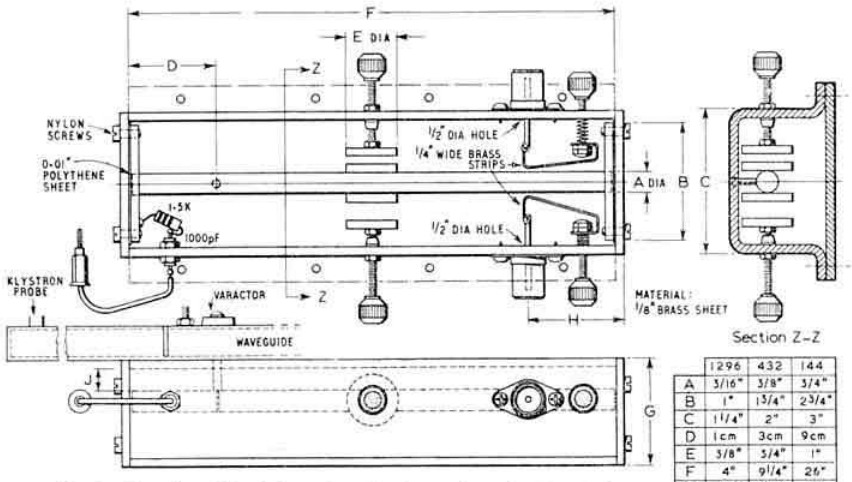
The attenuator and klystron mount at one end of the power supply chassis.



The interior of one of the signal tanks.

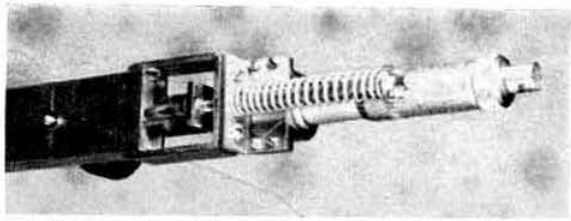
Tuning Up

After checking the power unit wiring (Fig. 3), switch on, allow a 5 minutes warm-up period and adjust the h.t. to 300 V. Allow a further ½ hour and recheck the h.t. Insert a 1N21 or similar diode into diode socket and connect a v.t.v.m. (10 V d.c. or less) to the bias line after removing the connector. Withdraw the attenuator from the waveguide. Adjust the pump cavity tuning, klystron external tuning and repeller voltage for maximum reading. Depending on the diode this can be up to 7 volts, but the value is not important. Replace the diode with the Varactor and repeat the tuning procedure, noting that the pump cavity will need retuning and the voltage output will be very low, usually less than 1 volt. Insert the piston fully into the cavity and slowly withdraw it, when at some point the diode voltage should show an increase, indicating oscillation at or near signal frequency. Now is the time to connect a converter, receiver and aerial. It is advisable to use a 6db pad between the amplifier and converter. A very rough note should be heard; if not, continue unscrewing the piston until this note is heard. Next increase the amount of attenuation until this oscillation stops. Connect the bias line and tune in a signal, or connect a signal generator, and adjust the trough for resonance. Decrease attenuation until oscillation almost starts, and adjust the idler until it does; then increase the attenuation sufficiently to stop the oscillation (thus reducing pump power), retune the idler and readjust the trough tuning. A systematic tuning procedure should be carried out always with the aim of reducing pump power. Having resonated the trough, the diode bias can be increased, while watching the "S" meter, retuning the trough and reducing pump power. If when the bias reaches 0 V the gain is still rising, reverse the diode (if possible) or battery and carry on with the tuning procedure, not forgetting the input and output loops, repeller

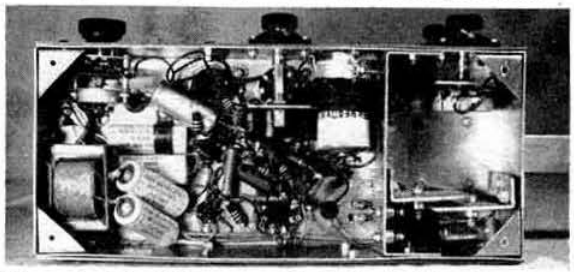


	1296	432	144
A	3/16"	3/8"	3/4"
B	1"	1 3/4"	2 3/4"
C	1 1/4"	2"	3"
D	1cm	3cm	9cm
E	3/8"	3/4"	1"
F	4"	9 1/4"	26"
G	1/4"	1 1/2"	2"
H	1"	1 1/4"	2 1/2"
J	0·4cm	0·4cm	0·4cm

Fig. 2. The signal tank layout, with dimensions for 144 Mc/s, 432 Mc/s and 1296 Mc/s.



An end view of the idler components. The Varactor tip can be seen protruding through a hole in the waveguide wall.



The underside of the power unit. In the right-hand compartment, two GJ5Ms are mounted on the isolated sheet heat shunts, the remaining two diodes being bolted direct to the chassis.

voltage and pump cavity adjustments. When the amplifier is producing just below 30db gain (five S units) it will be found that all further adjustment provides no more gain, as this is the practical limit and any further attempt to produce more gain will result in instability. Normally, if the amplifier is operated at between 20 and 25db gain level, adjustment holds for weeks on end, and retuning is only required for moves of more than 250 kc/s. Contrary to popular belief, this takes no longer than 5 seconds, adjustments being confined to trough and idler.

Varactor Diodes

The writer initially obtained a ZC20C, and this performed well at 570 Mc/s, producing pictures over the 140 mile path from London (BBC-2). At this frequency it had a measured gain of over 25db, but at 432 Mc/s, however, no gain could be obtained from this device, although the writer knows of at least one ZC20C that performs admirably on 70cm. Consequently, an MA450 was obtained, and this is currently providing over 25db of stable gain on 432 Mc/s, although very little gain can be obtained at over 500 Mc/s. This does not prove conclusively that the ZC20C is poor at lower frequencies and the MA450 poor at higher frequencies, but only that the techniques employed by the writer would not produce the desired results. Therefore, if possible, a selection of Varactors is highly desirable to obtain the best results.

Conclusion

It should go without saying that a parametric amplifier cannot produce S9 signals from under the noise, but it can open up new thresholds in v.h.f./u.h.f. reception, and is one answer to the E.M.E. amateur's prayer.

This article would not be complete without giving due credit to Mr F. T. S. Smith, G6FK, and Mr H. Mould, whose valuable assistance made the project possible.

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[2] "New Thresholds in V.H.F. and U.H.F. Reception," R. Bateman, W4AO and W. F. Bain, W4LTU, *QST*, December 1958, January, February and March 1959.
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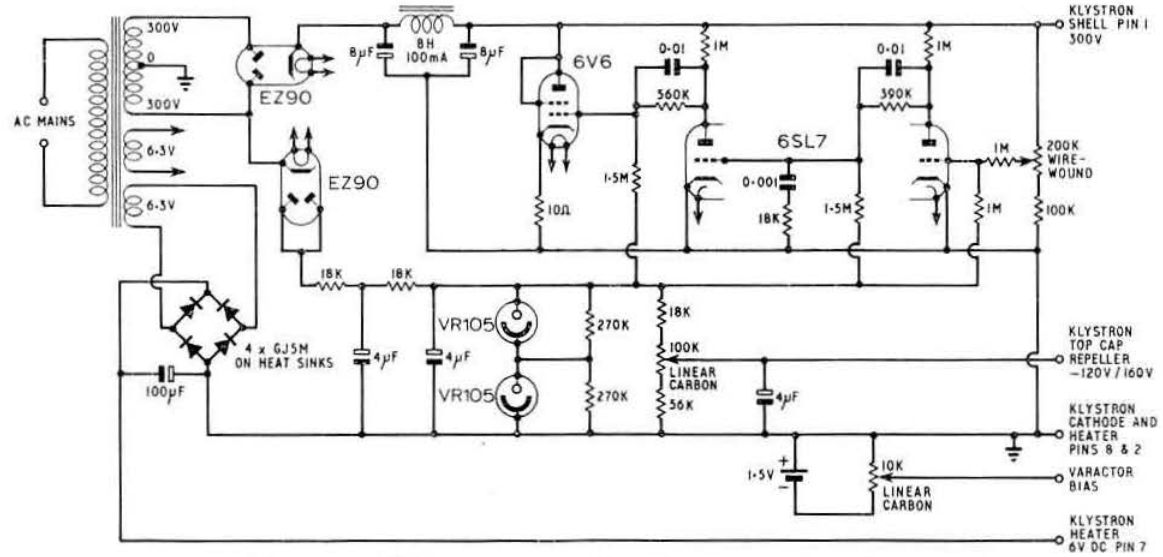


Fig. 3. The parametric amplifier pump oscillator power supply suitable for a 723A/B klystron. Remember, when constructing the klystron holder and operating the equipment, that the case of the klystron is 300 volts positive with respect to chassis.

Economizing Drive

By E. L. GARDINER, G6GR*

IT is surprising how many amateurs seem to run into the difficulty of not having quite enough drive-power to obtain the best performance from the final amplifier of a.m. and c.w. transmitters. This is especially common on the highest frequency band of a multi-band " table-topper," or when it is decided to extend the coverage to a higher band than was envisaged in the original design. C.w. operators particularly like to bias the final stage well into the class C region, so that there is no residual anode current flowing in the key-up condition to cause hash on the receiver when working break-in. This practice not only demands sufficient power from the driver stage, but also a high r.f. voltage to overcome the high standing bias. As the frequency is raised the L to C ratio tends to fall off, along with the input impedance presented to the drive by the final grid circuit, and thus the optimum grid-swing may become difficult or impossible to achieve.

The c.w. transmitter used by G6GR was built shortly after the war, the final stage being an 813. The transmitter is keyed in the cathode of an early buffer stage. It was intended for use at 14 Mc/s and lower frequencies, where the drive is sufficient to provide 150 watts input, but when an attempt was made to tune the final doubler as a tripler to permit operation on 21 Mc/s, however, the drive was only sufficient to give about half the maximum output from the 813, and many expedients were tried to achieve a better output from the existing exciter though without avail. There seemed no alternative but to build a more modern exciter, although it was noticed during tests that if the final bias were reduced to the class AB condition, 150 watts input at very fair efficiency was easily attainable. How convenient it would be if the full bias could be retained on the 813 in the key-up condition, but drastically reduced when the key was depressed, by some simple method which would work silently at keying speeds so as to retain break-in facilities!

The Transistor Switch

This could, of course, be achieved with the aid of a fast-acting relay, but after a number of experiments a more attractive solution was found: the use of a Mullard type OC28 transistor as a switch, which is both silent, reliable, and cannot be beaten by the fastest " Bug." The circuit is shown in Fig. 1, and is one of the simplest. The transistor is connected with its collector towards the negative bias supply, in the earthed-emitter configuration. The base is also returned to earth through a resistor, so that the transistor is normally cut-off. The maximum collector-to-base rating of the OC28 is 80 volts at zero current, whereas the actual bias used in this instance happens to be 75 volts. This seems rather a fine margin, but currents are small, and no trouble has been experienced. However, the higher rated OC20 or OC36 would be preferable, and for those who find higher values of standing bias necessary there are a number of transistors available having considerably higher ratings. In this application the transistor needs no heat-sink, and can be mounted directly in the wiring or upon a tag-panel in the most convenient position.

A portion of the drive entering the final stage is rectified to provide a negative bias, which is applied to the base of the transistor through a short time-constant filter as shown. This bias will cause the transistor to conduct immediately drive is applied, thereby virtually short-circuiting the bias supply to the final stage in the key-down condition. Full bias immediately returns to cut off the stage when drive ceases.

* 223 Tettenhall Road, Wolverhampton, Staffs.

A resistor VR1 must be included in series with the bias supply, both to prevent excessive current in the transistor collector circuit, and to protect the supply from excessive loading. It is difficult to specify the value of this resistor, as it will depend upon the nature of the bias source. Both the resistor and the amount of base-bias applied to the transistor may with advantage be adjustable, when it becomes a simple matter to set the residual bias remaining in the keyed condition to give the best overall performance from the transmitter. If battery bias is used, the resistor should be high, perhaps in the region of 100 K ohms, in order to avoid drawing too much current from the battery. If from a bias-pack, the resistor may be lower, 10 K ohms being used in the writer's equipment. In fact, a bias-pack having poor inherent regulation, owing to the use of potentiometers to set the bias, or high resistance filter components, may not need any added resistance at all. In the key-up state, little or no current flows through the resistor, and its value is unimportant. Care should be taken not to exceed the current rating of the transistor used, although with the power types recommended, having ratings in excess of 500 mA peak, this is most unlikely to occur.

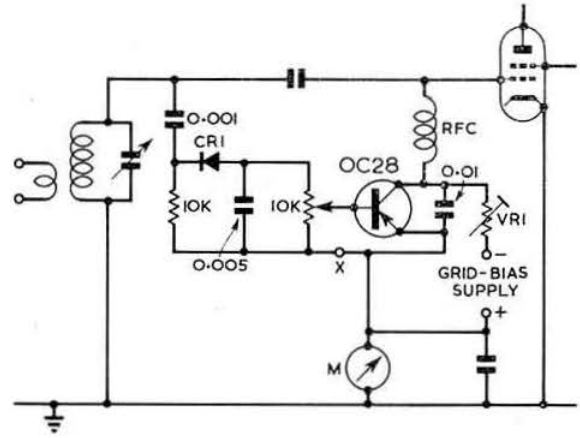


Fig. 1. The transistor switch circuit for reducing p.a. bias when the drive is applied. Circuitry is described in the text, including the selection of a suitable value for VR1. If the meter is omitted the positive supply should be connected to chassis.

The diode CR1 must be chosen to have satisfactory r.f. performance, and a p.i.v. rating in excess of the peak grid-swing available for the particular final amplifier in use. A Mullard OA202 proved adequate for the example described, and inexpensive Germanium diodes such as the OA81 or OA91 will suffice in low-powered equipment. In transmitters where the peak grid-drive exceeds 100 volts, two or more such Germanium diodes in series will be found to be an inexpensive and reliable substitute for more expensive high-rated types.

The circuit shown in Fig. 1 is typical of the bias switch applied to a final amplifier using shunt-bias feed to the control grid, but may be modified in detail to suit various forms of r.f. circuit. The bias supply and switch is virtually a self-contained unit which can easily be adapted to different

(Continued on page 153)

The modified 10m BCC set

The BCC 69 Transmitter Receiver

Specification and Modifications for 10m

By J. D. HARRIS, G3LWM*

THE introduction of smaller channel spacing for commercial v.h.f. mobile communications equipment has caused the replacement of all existing transmitters and receivers, the performance of which does not meet the new GPO regulations. A certain amount of the obsolete equipment has found its way into the hands of radio amateurs who rapidly realized the potential uses of the units disposed of by the British Communications Corporation.

Without modification, the type 69 transmitter-receiver is suitable for use on 4m and 2m provided the operator is content with single channel working. Generally, however, after ensuring that the equipment functioned in its original condition most operators converted the receiver to variable tuning and endeavoured to improve the sensitivity. There are undoubtedly a number of 69 sets lying idle due partly to a lack of confidence on the part of their owners to carry out modifications and partly due to a lack of information and inspiration. This article has been prepared with the hope that it will provide sufficient guidance to those who have not yet carried out work on this equipment.

The 69 set can readily be brought into operation on 4m and 2m and the performance in an unmodified condition is acceptable for the limited usefulness of single channel working. In addition to obtaining enhanced performance on these two bands the units can be converted to 10m which will be a most useful DX band for the next three or four years. In addition to suggested alterations for 10, 4 and 2m, circuit details and specification figures will be provided for the unit in its original form.

Circuit Description

The circuit for the complete unit is shown in Fig. 1. This is applicable to the D and E models only but the differences between these and the 69F and 69G are small and will be subsequently explained. The specification reveals some very good performance figures and this should be borne in mind when considering major modifications.

Transmitter

This section of the 69 is quite straightforward, and little, if any, modification will be needed to bring it into operation on the amateur band closest to the commercial band for which it was intended. The p.a., V12, is perhaps the only peculiarity by amateur v.h.f. standards, as it is a modulated grounded-grid stage, using a valve specially designed for this application, the STC 3B/240M. Unfortunately, as this configuration is not very common in commercial or government equipment of this type, the valve is not readily obtainable on the surplus market, and this fact is given serious consideration in the section discussing 10m modifications.

In the transmitter, the only differences between the high and low band models are (i) V14 is a doubler on ranges D and E, and a tripler on ranges F and G; (ii) L13-C85 tunes to the second harmonic of the crystal on ranges D and E, and the third harmonic of the crystal in ranges F and G.

Receiver

The operation of the front-end circuits of the D and E differ substantially from the F and G, and will thus have to be treated separately. To assist explanation of the mixing sequence, it will be assumed that the receiver has been peaked to operate on 4m, a frequency of 70·5 Mc/s being arbitrarily chosen for this example.

Reference to the block diagram, Fig. 2, will show that the input signal passes from the aerial through two inductively coupled tuned circuits to the r.f. amplifier, V1. The signal then passes through a further double-tuned r.f. transformer to the first mixer, V2, where it is heterodyned to the first (tunable) i.f. by the output of the local oscillator, V3. The oscillator crystal in this instance will be 11·25 Mc/s, and the anode tuned circuit of V3 selects the third harmonic of the crystal at 33·75 Mc/s, which will produce an i.f. signal of 36·75 Mc/s when mixed with 70·5 Mc/s. L7-C22 is tuned to the first i.f. It is from this point that a trick is used: the 33·75 Mc/s local oscillator signal, which naturally leaks through the first i.f. stage, is re-employed in the second mixer, V4, to heterodyne the first i.f. signal down to (36·75-33·75) 3 Mc/s, the final i.f. With a little calculation it can be seen, incidentally, that by making the local oscillator tune over the range 11·1833′ to 11·2833′ Mc/s, the receiver will accept signals in the band 70·1-70·7 Mc/s, our 4m allocation, and this forms the basis of the simplest modification to put the equipment into operation.

* 107 Cozens Road, Ware, Herts.

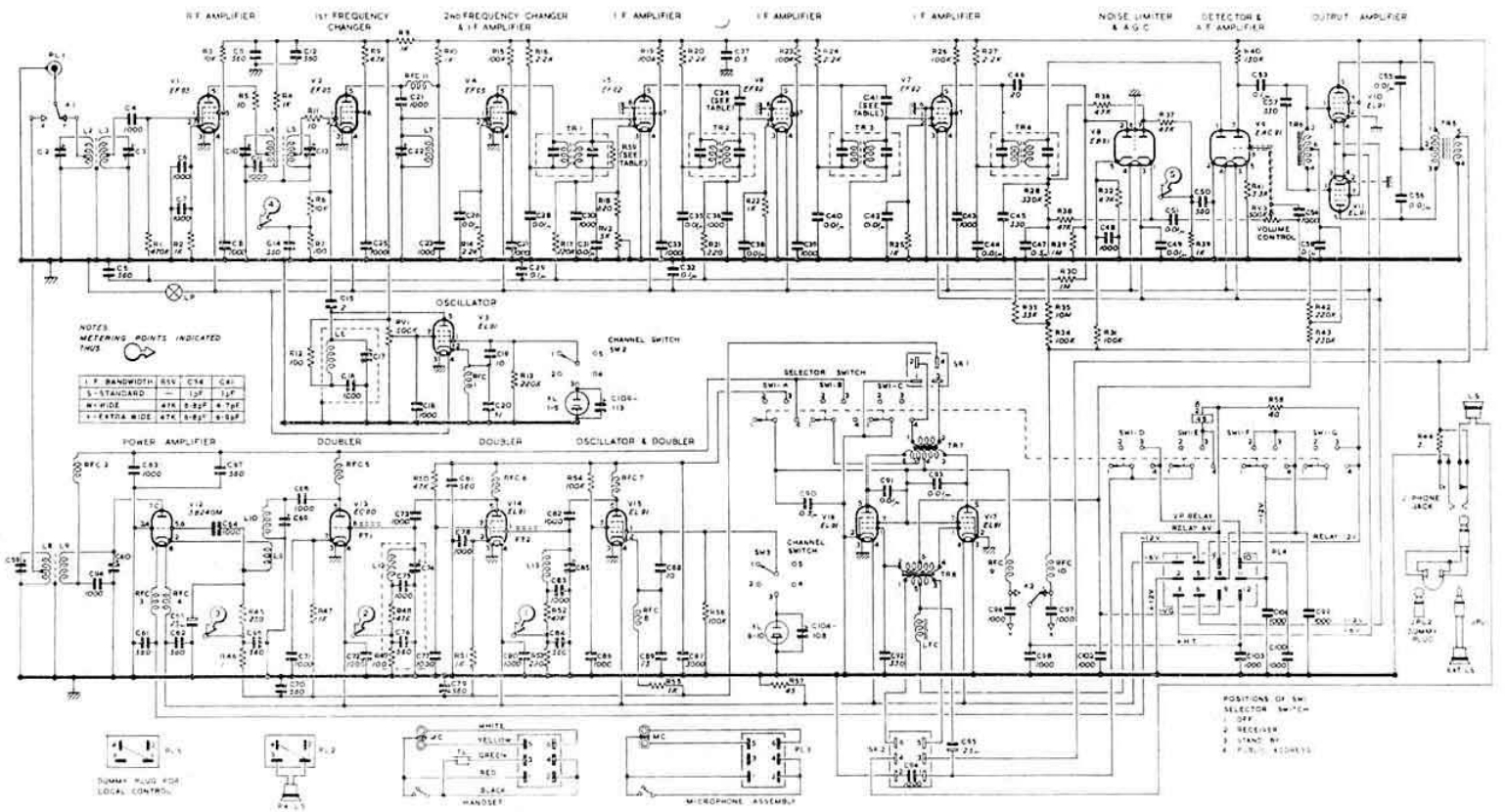


Fig. 1. The complete circuit of the transmitter-receiver unit for models BCC 69D and 69E. The slight differences between these versions and the F and G ranges are explained in the text. The unit is extremely compact, considering that it contains 17 valves, the case measuring approximately 10¾ in. wide × 8 in. deep × 4½ in. high. It was designed to operate with 50 ohm coaxial cable feeding a quarter-wave vertical whip (derived from the formula length = 2815/f in.) mounted on the vehicle roof. It requires a double-button carbon microphone, which can take the form of microphone in a case with the press-to-talk switch, or a GPO-type handset with switch. The dummy plug, PL5, can be eliminated with no loss of facilities by soldering a shorting link between pins 1 and 4 of SK1. Certain lower frequency crystals, using a higher multiplication factor, have been successfully used in these transmitters without noticeable loss of drive.

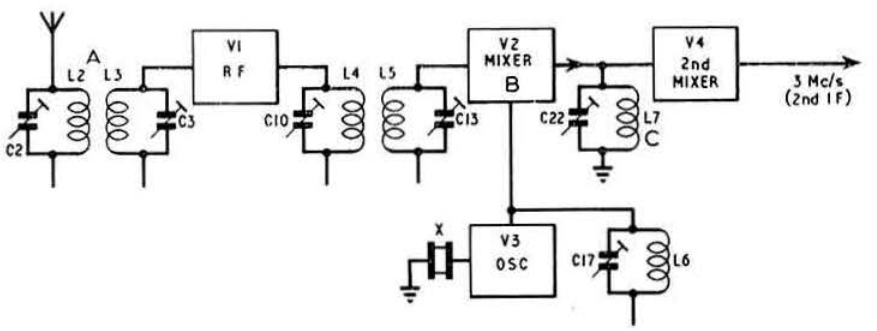


Fig. 2. Block diagram of the receiver r.f./mixer stages. The local oscillator provided is crystal controlled, and this must be converted into a stable v.f.o. for variable tuning.

In types F and G, the oscillator anode circuit tunes to twice the crystal frequency, which in this case will be 14·2 Mc/s if an input signal of 145 Mc/s is selected. The first i.f. is 88·2 Mc/s, which is produced by the fourth harmonic of the crystal mixing with the signal. This is then heterodyned with the sixth harmonic of the crystal, resulting in the standard i.f. of (88·2-85·2) 3 Mc/s.

The one remaining difference in the circuitry between the low and high band models is the provision of an image rejector trap in the input circuit of V1 for range G only.

Apart from providing a tunable oscillator, operating a model 69D on 4m is simply a matter of retuning, but to operate a model E on 4m, or models F and G on 2m, some coil adjustment in the transmitter and receiver sections is necessary.

Power Supply

This is a conventional synchronous type, which avoids the need for h.t. rectifiers. An internal relay is provided to switch the transformer secondary to give an increased h.t. voltage on TRANSMIT. Operation on positive or negative earth systems is possible by the appropriate choice of connections at the two tapping points *Y*, *Y* (see Fig. 3). Remember to check these points and also the polarity of C7 before initially switching on. Operation is possible only on the stated supply voltage (6, 12 or 24 volts), as the coil of relay B, the transformer and the vibrator cannot tolerate wide variations in voltage. A negative supply for the receiver output stage and the modulator is provided by an extra secondary winding plus the rectifier "W" and smoothing components R4, C11 and C12.

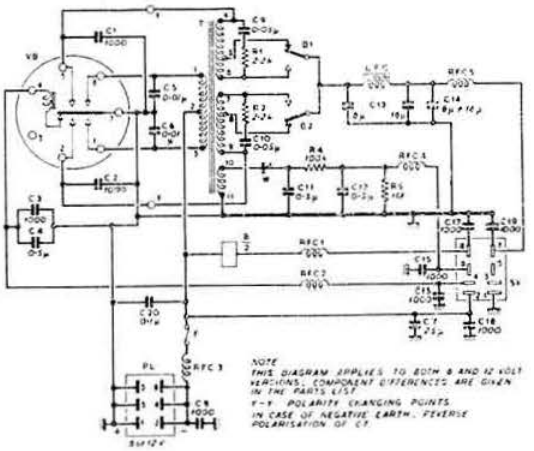


Fig. 3. Circuit of the vibrator power supply for the 69 set. It can only be used on a supply voltage for which it was designed, but is adaptable for positive or negative earth systems.

Interconnecting Cables

Fig. 4 illustrates the cables used in the original installation. If these are not available, note the differences between the 6 and 12 volt types. The heaters of V1 to V6 and V7 to V11 are connected in parallel in two groups; on 6 volts the two groups are in parallel, while on 12 volts they are in series. V13 to V17 heaters are connected in parallel with one side to chassis. The heater of V12 is in parallel with this combination for 6 volt operation, but on 12 volts is in series with the other heaters. The changeover of

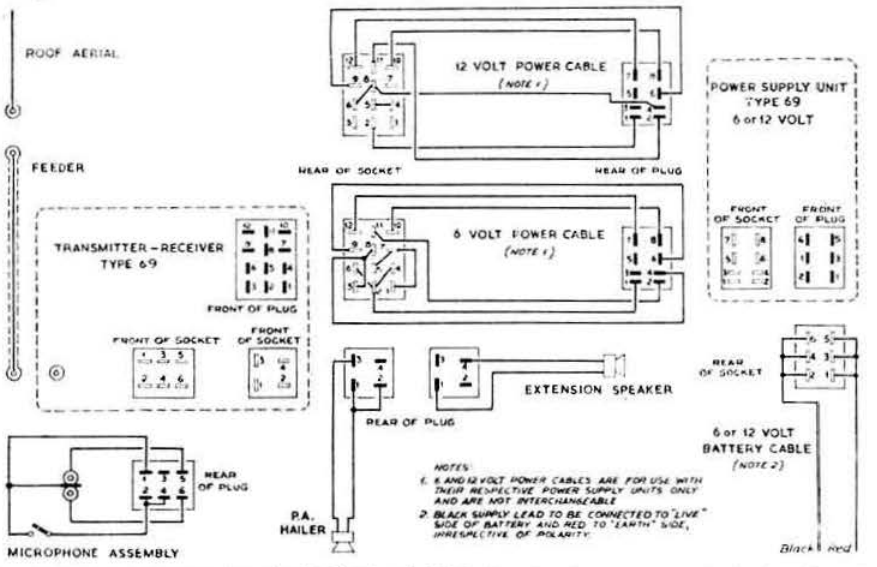


Fig. 4. The cables associated with the basic BCC 69 set and power supply for 6 volt and 12 volt operation.

Manufacturers' Performance Specification

Modulation: Amplitude.

Frequency Ranges: Type 69D 71·5-88 Mc/s
Type 69E 80-100 Mc/s
Type 69F 112-140 Mc/s
Type 69G 156-174 Mc/s

R.F. Input and Output Impedance 52 ohms

Power Supply 6 or 12 volts

Transmitter

R.F. Power Output 4-6 watts, depending on frequency range

Crystal Frequency Range D $\frac{1}{8}$, Range E $\frac{1}{8}$, Range F $\frac{1}{12}$, Range G $\frac{1}{12}$ of carrier frequency

Modulation Capability 100 per cent

Modulator Response Between 300 c/s and 3000 c/s the response is ± 2db of that at 1000 c/s

Harmonic Distortion Less than 10 per cent for 100 per cent modulation

Carrier Noise Level 53db below modulation depth of 30 per cent

Spurious Radiations Spurious signals do not exceed 2·5 μW at frequencies 100 kc/s or more from the carrier

Public Address Output 5 watts

Receiver

Sensitivity Input signal modulated 30 per cent at 1000 c/s for specified signal-plus-noise to noise ratio:
Range D better than 2 μV for 12db.
Range E better than 2 μV for 12db
Range F better than 3 μV for 12db
Range G better than 3 μV for 10db

Output at Sensitivity Signal 100 mW in 3 ohms

Crystal Frequency Range D and E $\frac{1}{6}$ (signal freq.-3) Mc/s
Range F and G $\frac{1}{10}$ (signal freq.-3) Mc/s

First I.F. Range D and E (3 × crystal freq.) + 3 Mc/s
Range F and G (6 × crystal freq.) + 3 Mc/s

Second I.F. 3 Mc/s

Second I.F. Selectivity

	Attenuation	*Bandwidth*
Standard	6db	not less than 14 kc/s
	85db	not less than 82 kc/s
Wide "W"	6db	not less than 36 kc/s
	85db	not less than 126 kc/s
Extra Wide "Y"	6db	not less than 40 kc/s
	85db	not less than 136 kc/s

A.F. Output 1 watt into 3 ohms

A.G.C. Change in output not greater than 6db for a change in input signal from + 10db to + 80db referred to sensitivity signal

Noise limiter Peak-clipping at 45 per cent modulation depth

Spurious Responses All attenuated at least 70db

Power Supply

Battery Volts	6·8 volts	13·8 volts
Receive	4·0 amps	2·3 amps
Stand by	6·3 amps	3·4 amps
Transmit	10·5 amps	5·4 amps
Public Address	6·0 amps	4·2 amps

the heaters for 6 or 12 volt operation is automatically effected at the plug PL4 when the appropriate cable is used.

Supply and Operational Circuits

The various functions will be described in full detail as tracing them out on the circuit diagram can be a most tedious and frustrating task, particularly if the reader is not used to this sort of operation.

Battery Supply. The black lead of the battery cable is taken to pins 2, 4 and 6 of the plug PL on the power supply unit. The supply is then fed through fuse F to the centre-tap of the vibrator transformer T and the coil of the relay B. Also from the fuse, the l.t. is taken to pin 2 of socket SK and via the power cable to the transmitter-receiver unit, plug PL4, pin 11. From here it is connected to the rotors of the selector switch SW-1-F and G.

The red lead of the battery cable is taken to pins 1, 3 and 5 of PL which are connected to chassis. This red lead must be connected to the earthed terminal of the battery, regardless of polarity.

Receive. When the selector switch is set to " R " (position 2), the rotor of SW-1-F connects the live side of the l.t. supply to pin 8 of PL4.

If the 6 volt cable is used pin 8 is linked to pin 3 which is connected to one side of the parallel connected receiver heaters. Pin 6 is linked to pin 2 (chassis) and so the heaters of V7 to 11 are placed in parallel with those of V1 to V6 and the signal lamp LP.

If the 12 volt cable is used, pin 8 is linked to pin 6 and so the two groups of heaters are connected in series. The transmitter heaters are not connected.

From pin 8 of PL4 the l.t. supply is returned to the power supply unit, pin 4 of SK, then via RFC2 to the vibrator coil, the other side of which is connected to chassis via the reed.

Both relays remain unenergized. Relay contact A1 connects the aerial to the receiver and A2 connects the h.t. supply (from PL4, pin 12) to the receiver.

Stand By. With selector switch at " S " (position 3) the action of SW1-F is as for RECEIVE while SW1-G connects the l.t. supply to pin 5 of PL4.

If the 6 volt cable is used, pins 1, 5 and 7 of PL4 are linked together so connecting the l.t. supply to the transmitter heaters; pins 2, 4 and 6 are also linked, thus connecting one side of V12 heater to chassis and all the transmitter heaters are now in parallel across the supply. The l.t. supply is also applied across the coil of relay A.

If the 12 volt cable is used, pins 5 and 4 are linked so placing V12 heater in series with the remainder with pin 1 of PL4 isolated. The l.t. is also fed from pin 5 via the dropping resistor to the coil of relay A.

SW1-E connects the relay circuit to SK2, pin 1. SW-1 D connects PL4, pin 10 (which connects with the relay B in the power supply) to SK2, pin 1. SW1-A completes the h.t. circuit to the transmitter valves V14 and V15, and SW1-B connects the tap on the modulation transformer to V12 and V13. No power is applied however, until the microphone switch is operated.

When the microphone switch is closed, pin 1 of SK2 is connected to chassis and the following changes occur: (i) pin 1 of SK2 is connected to chassis, energizing relays A and B. Relay A switches the aerial and the h.t. to the transmitter whilst relay B (in power supply unit) changes the taps on the transformer and thus increases the h.t. voltage. (ii) the centre contact of the microphone is connected to chassis,

thus applying 3 volts across each half of the microphone. The live side of the l.t. supply is already connected via PL4 pins 5 and 7 (6 volt cable) or resistor R58 (12 volt cable) to the centre-tap of TR8 primary.

In many units a link must be placed between pins 1 and 4 of SK1 to complete the cathode circuits of the transmitter chain. In commercial use, the circuit was intended to be completed in a remote control unit, or with a link in the p.a. speaker plug.

P.A. With the selector switch in the P.A. position the action of SW1-F, G, E and D is as for STANDBY.

SW1-C earths one end of the secondary winding of TR7 so completing the circuit to the external p.a. loudspeaker connected to SK1 pins 1 and 3. SW1-B disconnects the h.t. line for V12 and 13 from the modulation transformer TR7, while SW1-A connects the h.t. line direct to V12 and 13 in order to maintain a constant load on the power supply unit and prevent an increase in the h.t. voltage.

When the microphone switch is closed the effect is the same as for transmitting.

MODIFYING THE 69 SET

Owing to the writer's interest in RAEN on 10m, the BCC set was converted for operation on this band, and only a trial attempt at 4m was made. Consequently, the following description caters for the lower band, but some of the alterations nevertheless apply to v.h.f. operation.

Transmitter and Modulator

The r.f. section was completely removed and in this existing space, using many of the same components, a conventional three stage EL91 oscillator/tripler, EL91 buffer and 5763 transmitter p.a. was constructed (Fig. 5). The modulator was not touched with the exception of the heaters, which were wired in series across the supply. The first two stages of the transmitter were also wired in this manner, but the 5763 had to be

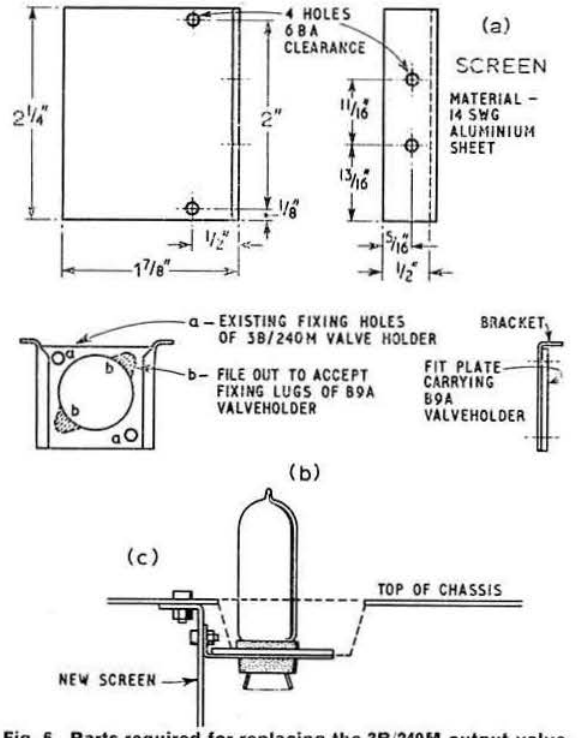


Fig. 6. Parts required for replacing the 3B/240M output valve with a B9A based type. (a) Cutting and drilling details for a supporting screen; (b) dimensions of the valveholder supporting plate—the bracket on to which it was fixed formed the original support for the 3B/240M; (c) the final assembly.

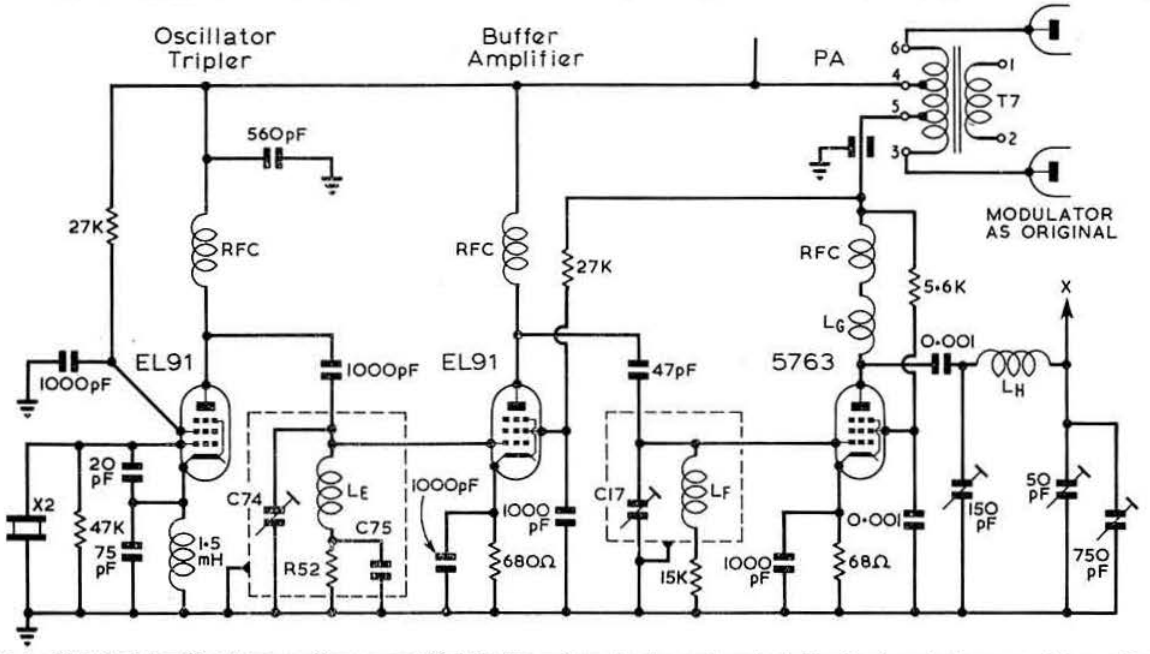
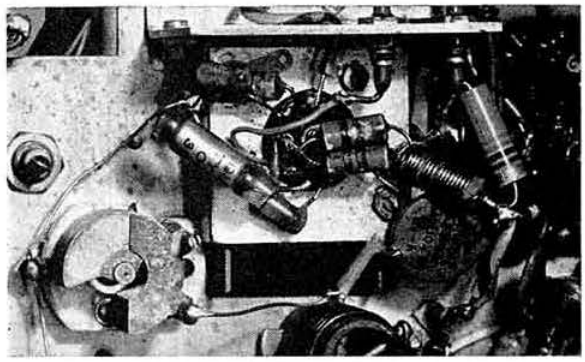


Fig. 5. Circuit of the 69 set transmitter as modified by the writer. Heater and control circuitry is not shown, and for series-parallel operation using a 12 volts supply a resistor of 7·1 ohms is required in the heater line to the 5763. V16 and V17 have negative bias. Pin 6 of TR8 is connected to the negative 12 volt supply.

connected in series with a 7·1 ohm resistor. Although the existing modulation system was used, it is felt that perhaps two 5763s or 6BW6s, one as the p.a. and the other acting as the modulator, using the transformer as a conventional centre tapped choke, would give better results. Furthermore, some additional audio stages would have to be provided if it is desired not to use the existing carbon microphone. The original microphone input transformer has, incidentally, been used (not by the writer) as the output transformer of a small transistor preamplifier which provided sufficient gain to give adequate modulation depth from a low impedance moving coil microphone.

Although the channel switches were removed it is better to leave them in place particularly if multi-channel operation is required.

As the p.a. valve is not easy to obtain, and expensive if purchased new from the manufacturers, it is suggested that no matter what other modifications are carried out, this is changed. The 3B/240M, which has a top cap anode connection, is mounted horizontally under the chassis, which means that the anode circuits are some distance from the base. Therefore, if a QV02-6 (5763) or QQV03-10 is substituted, it will have to be mounted vertically in order to maintain a suitable layout. Unfortunately, however, there is insufficient clearance between the chassis and lid to allow such a valve to be plugged into a standard chassis mounting holder,



New wiring associated with the 5763 p.a. stage.

which means that unless a special " sunk " holder can be purchased, a further bracket must be incorporated.

A suitable form, utilizing the original bracket, is shown in Fig. 6. A small screen must be fabricated on the lines of (*a*), which bolts to the main chassis in place of the valveholder bracket. This latter bracket is fitted with a new plate carrying a B9A valveholder (*b*), and then bolted to the face of the

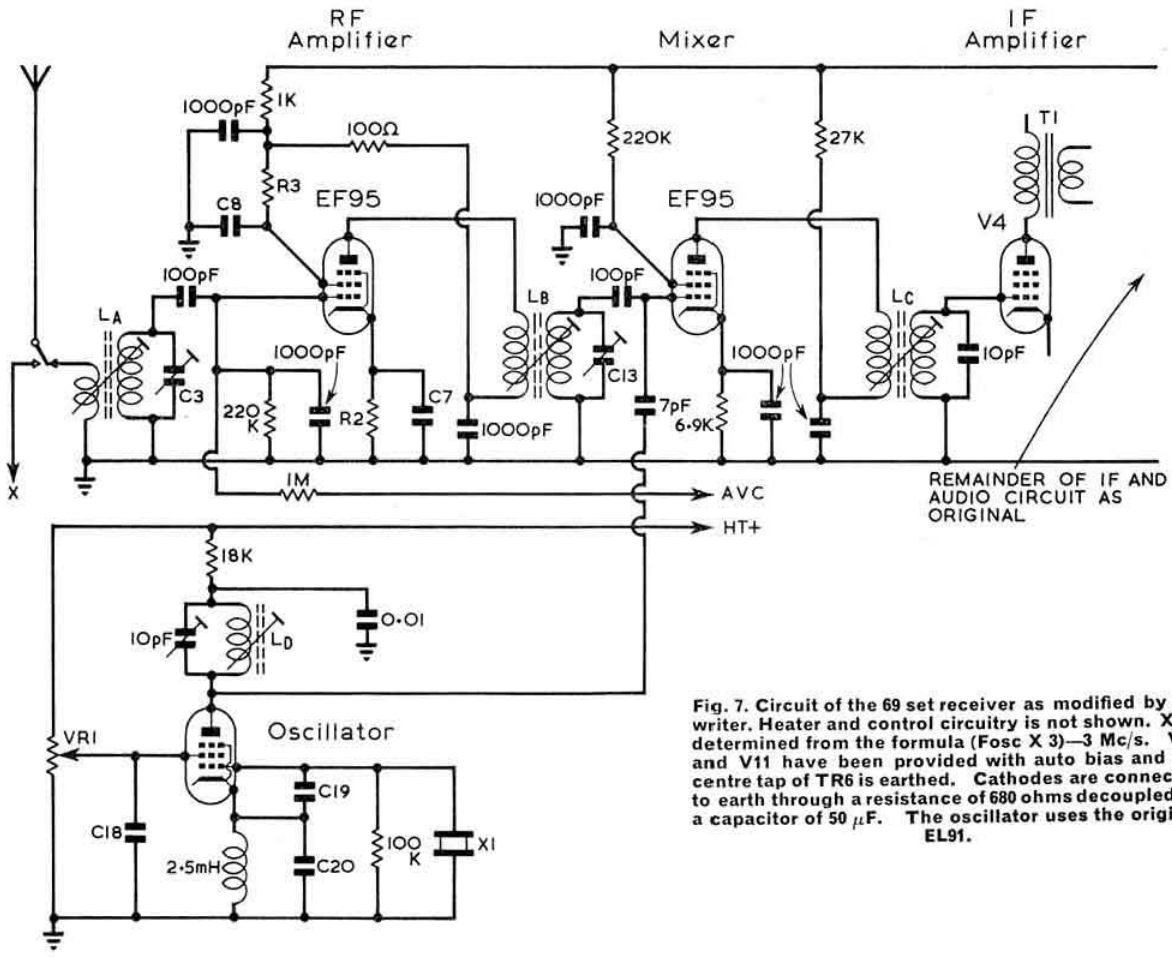


Fig. 7. Circuit of the 69 set receiver as modified by the writer. Heater and control circuitry is not shown. X1 is determined from the formula (Fosc X 3)—3 Mc/s. V10 and V11 have been provided with auto bias and the centre tap of TR6 is earthed. Cathodes are connected to earth through a resistance of 680 ohms decoupled by a capacitor of 50 μF. The oscillator uses the original EL91.

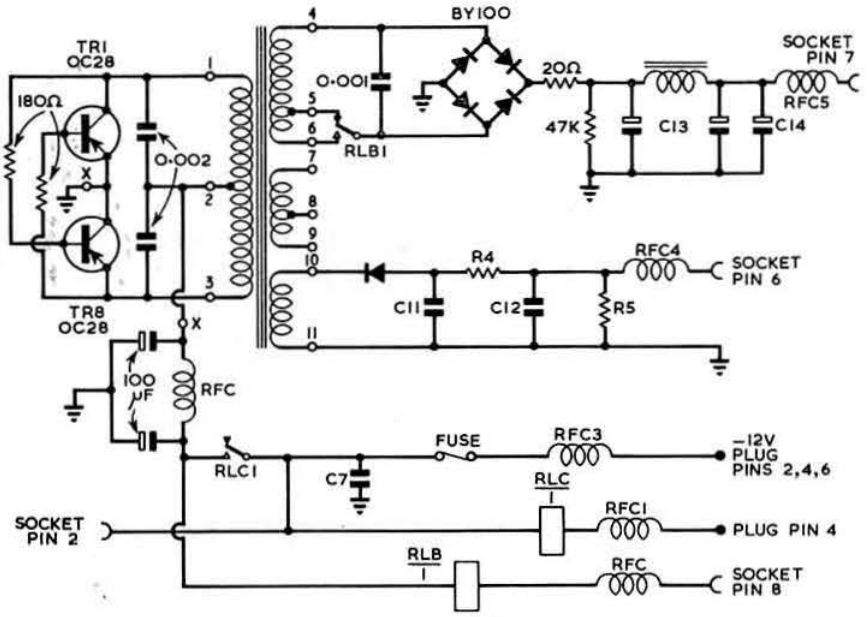


Fig. 8. Circuit of the 12 volt power supply after the vibrator has been replaced by two OC28 transistors. The additional choke consists of a 2 in. winding of 14 s.w.g. enamelled wire, ¼ in. diam. This circuit can be used with a negative earth system if the connections X, X are transposed, and the polarity of the three electrolytic capacitors across the battery supply line is reversed.

screen such that its upper surface touches the ends of the flanges extending downwards either side of the large rectangular hole in the chassis (*c*).

If it is desired to use the existing tuning capacitors, the interstage coupling systems used in the original transmitter should be adhered to. It may also be found worthwhile retaining the d.c. test points.

Should the crystal switching components be removed it will be found that there are two holes slightly to the rear of C12 which will accept an FT243 holder, and a further two holes in front of the metering point 1 which will take an HC-6/U holder. The writer used the former for the receiver crystal and the latter for the transmitter.

Receiver

As the receiver was only required to operate on a single channel, 28·889 Mc/s, the existing front end up to the grid of V4 was removed and replaced with a conventional mixer-oscillator circuit (Fig. 7). V1, V2 and V3 retain their original functions, with V3 operating as an 8625 kc/s crystal oscillator. The anode circuitry is removed and replaced with a coil and trimmer to resonate at 8625 × 3. The cathode injection for V2 is replaced by grid injection. Retention of RV1 is advised as this permits obtaining optimum oscillator injection. V4 becomes an additional 3 Mc/s i.f. amplifier. R59, C34 and C41 should be removed (if fitted) to reduce the bandwidth. R33 is made variable as the existing noise limiter was found to be rather vicious.

If a 69D is owned, single channel receive is, as shown earlier, possible on 4m by selecting the correct crystal. Although the first i.f. bandwidth on range D is 200 kc/s, reasonable results have been obtained by substituting the receiver crystal with a tuned circuit plus a grid block capacitor (100 pF) enabling the receiver to be tuned over the band. The same principle could no doubt be adopted on 2m, with ranges F and G, the first i.f. bandwidths of these models being approximately 400 kc/s. If this method of tuning is adopted it is not easy to get a particularly stable receiver, but it does lend itself to the use of varicap diodes, as are currently being used with B44s.

Removal of the receiver crystal channel switch leaves plenty of room for additional receiver modifications as required.

Coil details for the 69 set 10m modifications

Receiver section

L_A primary, 4 turns; secondary, 16 turns, 20 s.w.g.
L_B anode, 18 turns, 24 s.w.g. grid, 12 turns, 20 s.w.g.
L_C Electroniques type QM.1-8 MX.
L_D 15 turns, 24 s.w.g.
L_A, L_B and L_D are wound on Aladdin ⅜ in. diam. formers.

Transmitter section

L_E original former of L12 rewound to resonate at required frequency using C74 (3-30 pF). Use original screening compartment in same position as in original layout.
L_F Original former of L6 rewound to resonate at required frequency using C17 (3-30 pF). The screening box for L6 and C17 is removed from its original position and is replaced on the top of the chassis with leads passing through the hole obtained by the removal of C69.
L_G anode stopper, 18 turns, 20 s.w.g., wound on 33 ohm ½ watt resisistor.
L_H 9 turns, 18 s.w.g. on ⅜ in. former, spaced wire diameter.

Power Supply

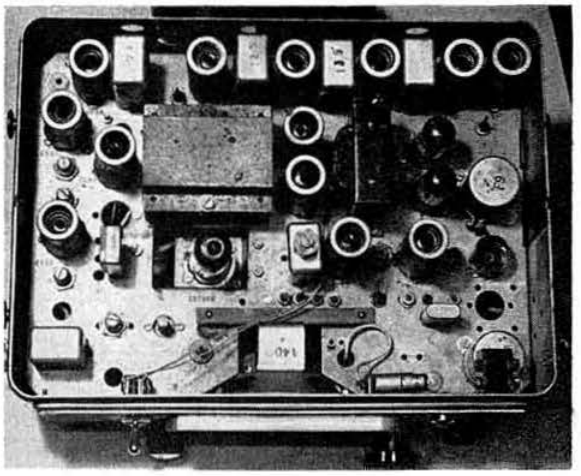
The noisy vibrator power pack was converted at the first available opportunity to utilize transistors, the circuit adopted being on the lines of one published in "Matters Mobile," RSGB BULLETIN, January, 1966. Fig. 8 shows the circuit of this power supply. RLB retains its function of switching the h.t. voltage, but another relay, RLC, is incorporated so that the battery supply can be remotely controlled. The two power transistors were mounted on a commercial heat sink drilled for two TO3 transistors. This was then bolted to the outside of the original power supply case. The transistors could be mounted on the actual case, but the material is rather thin and may not provide adequate heat dissipation.

Mains Operation

While it is, of course, possible to drive the vibrator transformer from 12 volts a.c. and adding diode rectifiers, it is felt that removal of the existing transformer and substituting a normal mains transformer would be a better approach for mains operation. Remember, however, that the relays and carbon microphone will require a d.c. supply.

Conclusions

Along with the other types of surplus commercial v.h.f. equipment, the BCC 69 is playing its part in promoting



activity, particularly on 4m. While not wishing to attack Top Band, v.h.f. has much to offer for local net operation, local, in this context, referring to distances within about 25 miles. Admittedly, the lower frequency bands are ideal for conducting experiments with transistor transmitters, and this promotes commendable amateur research. Nevertheless, the freedom from interference on 4m and 2m, and 10m, is an outweighing advantage to most operators.

The manufacturers of this range of equipment, the British Communications Corporation, have been most co-operative in supplying a quantity of handbooks, and some of these are still available from the writer on receipt of a remittance of 2s. to cover postage charges. It must be pointed out, however, that BCC can no longer supply information, or the sets, and will therefore be particularly grateful if amateurs do not contact them regarding this equipment. While not assuming himself an expert, the writer is willing to assist any Society members, wherever possible, concerning the 69.

Thanks are due to G3NRB and G3PZA for certain technical assistance during the modification of the 69 set and in preparation of this article.

An Alternative Filament Circuit for the Calibrator No. 10

By F. G. RAYER, Assoc. I.E.R.E., G3OGR*

THE calibrator type 10 is a versatile crystal calibrator intended for use within the range 1·5 to 10 Mc/s, but which is quite suitable for aligning receivers up to the limit of the h.f. spectrum at 30 Mc/s. The 500 kc/s oscillator produces signals at 500 kc/s intervals, recognizable by one second pulse modulation, and a v.f.o. is incorporated for interpolating to within 2 kc/s. It is thus a very useful station accessory for those who do not own a BC221, but, suffers from the limitation of requiring a 12 volt battery supply for the valve heaters.

The calibrator employs three valves, two IT4s and a IR5, each employing 1·4 volt heaters. In series with each heater is connected a choke, of d.c. series resistance 30 ohms, which increases the required voltage to 3V. Each valve/choke combination, however, is connected in parallel, and thus the overall input voltage required remains at 3V; in the equipment as designed, the difference between this 3 volts and the 12V supply is accounted for in the network (Fig. 1) R19, VR1 and R20. L4 introduces negligible resistance. Therefore, by the simple expedient of introducing a new lead, shown dotted in Fig. 1, the equipment can be made to operate on the lower, more convenient voltage. In order to reduce battery drain, R19 should be disconnected from the chassis.

The drain at 3 volts is only 0·3A, which can easily be supplied by a small two-cell dry battery, thus obviating the need for an unnecessarily cumbersome 12 volt battery pack.

* Reddings, Longdon Heath, Upton-on-Severn, Worcs.

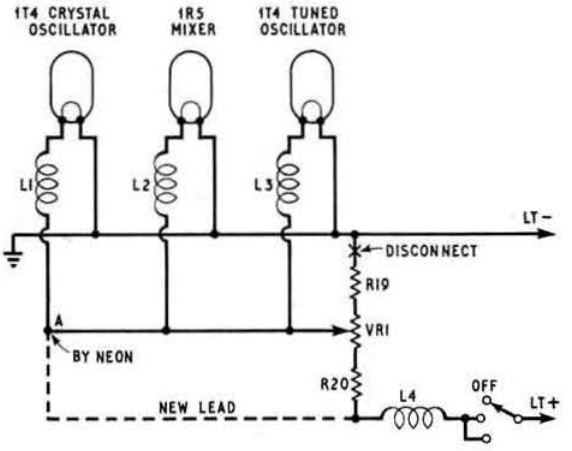


Fig. 1. The calibrator filament circuit, showing the two modifications required to reduce the necessary voltage from 12 volts to 3 volts. The most accessible point (A) at which to attach the new lead is close to the neon modulator.

Cycles or . . . ?

Hertz City, Ohio, 15 Sept.—A three year old boy inadvertently peddled his trihertz in the path of an oncoming motorhertz. The hertzist lost control trying to avoid the lad. Both the hertzist and the motorhertz did several hertzoids before coming to a stop. The motor hertzist was identified as a Mr A. C. Cycle, 60 of nearby Currentown, Ohio. In the accident report, it was stated that Cycle said " It only hurtz when I laugh."

—Collector and Emitter

I thought that I was going Nertz
The day they named the cycle Hertz.
From names like DeKhotinsky save us.
When will they name the second Avis?
What now of foot-pounds, ergs and joules
Will they be names for water fowls?
To quote the Bard, would rose smell sweeter
If name were changed to foot or metre?
Oh, doctors, eggheads, profs and seers
Please don't confuse us engineers.

—Collector and Emitter

A Modulation Monitor

By A. WHITELOCK, G3BNM*

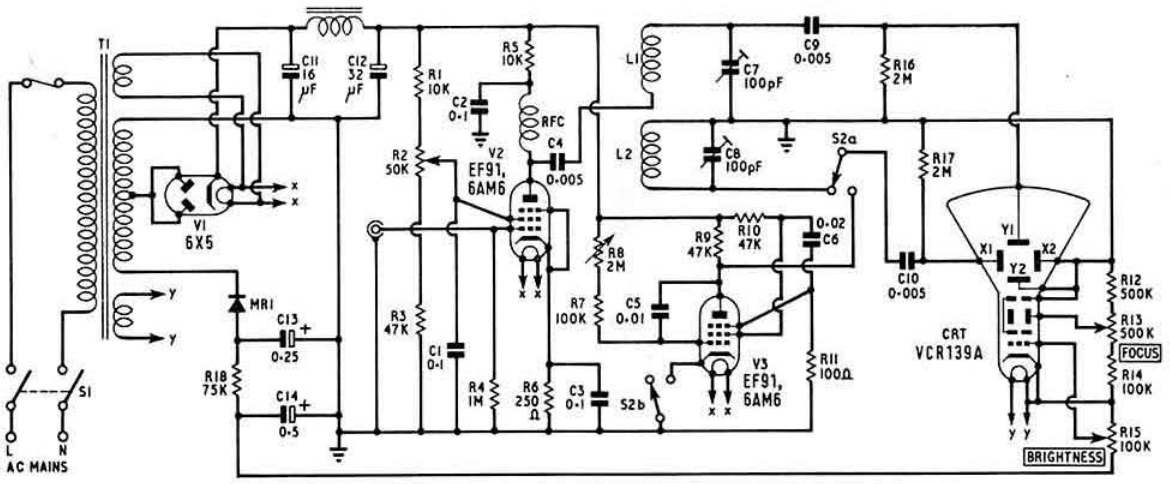


Fig. 1. The complete monitor circuit which provides facilities for displaying a circular trace for rapid assessment of modulation depth, and also for producing a normal envelope pattern. T1 is a 350-0-350V transformer, with two 6·3V windings.

A MODULATION monitor is generally accepted as being an accessory for visually displaying a transmitted a.m. signal in such a way that the modulation envelope can be seen and checked for quality. This facility is not difficult to incorporate in a transmitter, and one of the most useful presentations, a trapezoidal display, merely requires one resistor, one capacitor, a coupling loop for sampling the r.f. output from the p.a., and a connection to the modulated h.t. supply. This form suffers from the disadvantage, however, that the monitor is restricted to use with just one transmitter, but this can be overcome to some extent, though with the loss of some facilities, by constructing a demodulator for separating the audio signal from the r.f. output, and applying both to the monitor which can then be a separate test unit. Despite this expedient, however, it is not as versatile as it could be, for the demodulator must sample a reasonably large signal, such as that obtained from a tank circuit or a.t.u. The obvious solution is to monitor the transmission with the station receiver. At first sight, it would seem that a similar unit could be suitable for this application, but to achieve maximum versatility, a slightly different technique should be adopted.

A Receiver Signal Modulation Monitor

Instead of detecting the r.f. and generating a trapezoid, r.f. can be applied to both pairs of deflection plates of a cathode ray tube, with one pair receiving the signal 90° out of phase, thus creating a circular trace. With this principle, modulation will appear as a thickening of the trace, a 100 per cent depth producing a bright disc of twice the diameter of the carrier circle. Any overmodulation will produce a bright spot or disc in the centre, caused by overlapping of the trace.

The other feature of this system is the ability of the monitor to display a circular trace even when a signal is below the receiver noise level, and in this way the monitor can be usefully employed as a tuning indicator. It will operate quite happily at levels where a conventional S meter would be completely useless.

* 8 Station Cottages, Alne, Yorkshire.

A circuit which will operate in the manner described is, in fact, incorporated in the Third Edition of the RSGB *Amateur Radio Handbook*, but in the writer's experience it is inadequate in that it is too insensitive to couple direct to a receiver i.f. circuit. Consequently, this circuit has been developed into a complete, self-contained test unit incorporating a suitable amplifier, and also a timebase to permit the display of the actual signal envelope. The latter facility does not involve the usual complicated speed switching, for the unit operates from the receiver i.f., and only a limited range is thus required.

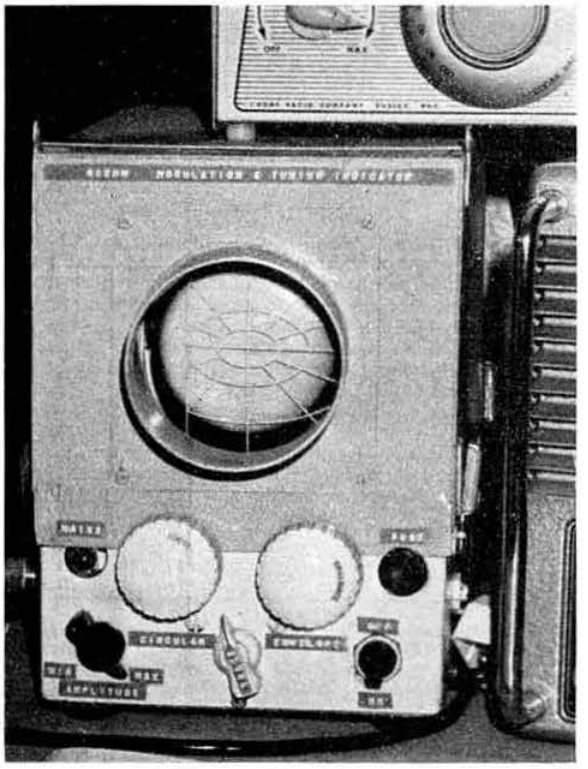
The signal should be taken from the receiver at the anode of the last i.f. valve, using coaxial cable. In order to prevent undue changes of capacitance affecting the last stage, a low value coupling capacitor, e.g., 5 pF, should be inserted between the coaxial cable and the anode connection. The amplifier stage of the monitor, V2 (Fig. 1) has a high input impedance, and thus should be able to obtain quite sufficient drive from the receiver.

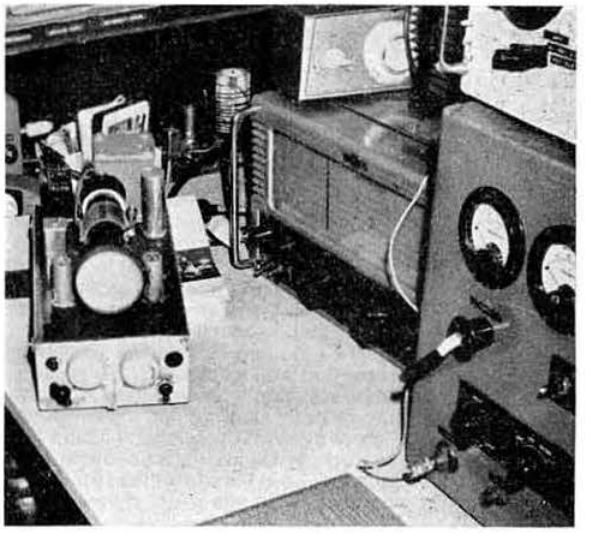
After amplification in the aperiodic stage V2, the signal passes to the series resonant circuit L1–C7, and thence to the c.r.t. *Y* plates (*Y2* being connected to earth). L1 is actually one winding of an i.f. transformer, compatible with the receiver i.f., and the other identical winding, L2, parallel resonant with C8, is used to derive the 90° out-of-phase voltage. When the mode selection switch S2a is set to the position as shown, this voltage is fed to the *X* plates (*X2* being earthed and thus common to *Y2*).

The alternative envelope display is produced by switching S2 to the other position, which disconnects the 90° phase from the *X* plates, substituting the output from the timebase (V3), and also completes the timebase cathode circuit. If the timebase were left running continuously, the signal would undoubtedly severely interfere with the circular display. Timebase speed control is effected by variation of R8.

Setting up the Monitor

The cores of the transformer L1-L2 should first be withdrawn sufficiently to enable all necessary adjustments to be accomplished by variation of C7 and C8. Set S2 to circular





The monitor with the cover removed beside the station receiver and transmitter. The mains transformer is mounted below the chassis.

The panel of the writer's monitor unit. The graticule has been specially calibrated to provide indication of modulation depth.

trace. A strong, steady carrier, preferably from a signal generator, should next be tuned to the centre of the receiver passband *very* accurately and the trimmers adjusted for the best attainable circular trace. It is probable that a perfect circle will not be possible to achieve, but this will not impair operation. It will be found that C7, which tunes the primary, governs the trace size and height when displaying the envelope, while C8 controls the shape, or width of the ellipse.

The power supply provides 350 volts for V2 and V3, and also 650-700 volts for the c.r.t. e.h.t. requirements.

Conclusions

This test unit can provide immediate indication of lack of, or over-modulation, in every station transmitter, including v.h.f. equipment. It must be remembered, however, that it will not detect some faults that can be shown up with a monitor which produces a trapezoid from the transmitter r.f. output and modulating voltage. But this limitation is offset to some extent as it is a valuable tuning indicator, and provides the operator with the facility for accurately report- on the state of other amateurs' signals.

Economizing Drive

(Continued from page 143)

types of transmitter. If a grid-current meter is required, it can be inserted at the foot of the grid choke, or in the earth-return of a series-connected grid circuit. The suggestion shown permits the meter to be at earth potential, and in this instance it must be shunted by an effective by-pass capacitor, and common to both the transistor and bias return circuits since the total grid current will be divided between these two paths. When no meter is used in the position shown, the bias positive terminal must be earthed.

In lower powered transmitters it may be found that there is insufficient bias derived from the drive to control the transistor fully, and that some current flows through VR1 when the key is up. This can also be a defect when battery bias is used, and VR1 is made high to reduce current drain. The switching action will be improved by the addition of a small positive bias at the point marked " X " in the diagram, thereby ensuring that the transistor is completely cut-off under all conditions; whilst a more positive switch-on action is obtainable by substituting a simple voltage-doubler circuit to derive a higher bias for the transistor, on the lines of the system used to derive screen-bias in the G2DAF linear amplifier (RSGB BULLETIN, April, 1963). Additions of this nature were not found necessary in the writer's transmitter, where ample bias reduction was provided by the simpler form of circuit illustrated.

Conclusion

It is hoped that this example of the use of a transistor switch to overcome one common transmitter defect, while by no means universally required in this particular form, will draw the attention of experimenters to a most valuable technique in wide commercial use, and having applications in innumerable other facets of amateur equipment design.

A Directory of Semiconductor Manufacturers

By MRS K. M. PRIESTLEY*

IN this country there are some 16 semiconductor manufacturers who between them produce thousands of different transistors, a similar number of diodes, and a multitude of other assorted devices.

To discover who makes what, and where you, an individual amateur, can purchase their products, I wrote to them all. The response in terms of willingness to deal with small orders, selection data and price lists was most encouraging; only one did not reply. One, the Marconi Company Ltd., make special devices only and do not deal with small orders, and two others, Mullard Ltd., and Newmarket Transistors Ltd., said that they only deal with wholesalers. To purchase their products you must buy from a retailer either in person, or by post. You may be lucky and find just the device you want in your local shop, otherwise you have the choice of taking whatever is in stock, which may be a poor substitute, persuading your retailer to obtain the correct item for you, or finding a retailer who stocks what you want. If you can buy direct from the manufacturer, you should be able to obtain exactly what you require quickly, easily and possibly at less expense.

The Sources

The twelve manufacturers who are willing to deal with small orders are listed in Table 1. The second column gives the address to which orders and enquiries should be sent. In some cases this is the Sales Department at the factory and in others it is an agent or distributor. The following columns indicate very briefly the sort of devices each one makes. A small selection is less than a hundred, and a large selection is more than a hundred.

The makers are naturally more interested in selling thousands than singles, as you would be in their place, but they have shown themselves willing to help. Let us do what we can to help them, by making all orders as clear and concise as possible. If you have any questions, write to the firm con-

* 43 Raymond Road, Langley, Slough, Bucks.

TABLE 1

Manufacturer	Address or Distributor	Transistors Germanium	Transistors Silicon	Diodes Germanium	Diodes Silicon	Other Products	Special Conditions
AEI Ltd., Semiconductors	W.E.L. Components Ltd. 35-37 Greyfriars Road, Reading, Berks.		Small selection	Small selection	Large selection	Sprague components Microwave mixer diodes. Matched diode quads.	Possible discount (see text)
Ferranti Ltd., Electronics Department	Gem Mill, Chadderton, Oldham, Lancs.		Large selection		Large selection	Voltage variable capacitor diodes	
Hewlett-Packard Ltd.	224 Bath Road, Slough, Bucks.	Specialized solid state devices (see text)				Microwave mixer diodes	
Hughes International (UK) Ltd.	Townsend-Coates Ltd., Coleman Road, Leicester 5†		Small selection	Small selection	Large selection	Voltage variable capacitor diodes	
Microwave Associates Ltd.	Cradock Road, Luton, Beds.	Specialized solid state devices (see text)				Microwave mixer diodes. Varactors	
Motorola Semiconductor Products Inc.	Celdis Ltd., 4 Trafford Road, Reading, Berks.	Large selection	Large selection		Large selection	Field effect transistors Voltage variable caps. Varactors	Minimum order £2.10s.
RCA Great Britain Ltd.	Lincoln Way, Sunbury-on-Thames, Middlesex.	Large selection	Large selection		Large selection	Field effect transistors. Tunnel diodes	
SGS-Fairchild Ltd.	SASCO Ltd., PO Box 20, Gatwick Road, Crawley, Sussex.		Small selection		Small selection		Minimum order £1.
STC Ltd., Thorn-AEI Radio Valves & Tubes Ltd.	Electroniques, Edinburgh Way, Harlow, Essex.	Small selection (Brimar)	Small selection (STC)	Small selection	Large selection	Large selection of other components for Amateurs	Standard p. and p. 3s. 6d.
Texas Instruments Ltd.	12 Wellcroft Road, Slough, Bucks.	Small selection	Large selection		Large selection	Field effect transistors	
Transitron Ltd.	Appointing Distributor soon		Large selection	Large selection	Large selection		

† The following are also approved distributors for Hughes International (UK) Ltd.: Dage (GB) Ltd., 1 Penn Place, Rickmansworth, Herts. Electronic Component Supplies (Slough) Ltd., 2Wellington Street, Slough, Bucks. A. C. Farnell Ltd., 81 Kirkstall Road, Leeds, 3. Morris, Warden & Co. Ltd., Morden House, 10 Royal Crescent, Glasgow, C.3. Quardon Electronics (Semiconductors) Ltd., Slack Lane, Derby. S.D.S. (Portsmouth) Ltd., 67/69 Commercial Road, Portsmouth.

TABLE 2

GERMANIUM TRANSISTORS

Function	Type	Pol.	F_T(min)	P_D	Performance	Manufacturer	Price
L.F. small signal general purpose	2G301 and 3	*p-n-p*	3·0 Mc/s	0·2W		T	
	2G302 and 4		7·0	0·2		T	5s.
	2G308		3·0	0·2	n.f. <5db at 1 kc/s	T	
	2G309		12·0	0·2		T	or
	2G371		1·0	0·2		T	
	2G374		1·0	0·2		T	less
	2N2613		10αT	0·1		R	
	2N2614		10αT	0·1		R	
	2N404		4α	0·15		R	
	AC113 and 5		2	0·2		E	6s. 6d.
	AC155 and 6		1·8	0·2		E	to
	AC165		2	0·2		E	10s.
	2N1303		3α	0·15	β increasing with Fα	RT	
	2N1305		5α	0·15		RT	7s. 6d.
	2N1307		10α	0·15		RT	
	2N1309		15α	0·15		RT	or
	2N1302	*n-p-n*	3α	0·15	β increasing with Fα	RT	
	2N1304		5α	0·15		RT	less
	2N1306		10α	0·15		RT	
	2N1308		15α	0·15		RT	
L.F. large signal	2N2953	*p-n-p*	1·0	0·3	typical h_{FE} 350	R	
	AC154		2	0·2		E	6s.
	AC166 and 7		2	0·2		E	
	AC177		2			E	to
	AC157	*n-p-n*	2·5	0·2		E	
	AC168		2·5	0·2		E	15s.
L.F. high power	2N1183, A, B	*p-n-p*	·5α	7·5‡		R	
	2N1184, A, B		·5α	7·5‡		R	10s.
	2N2147 and 8		4T3T	12·5‡		R	to
	2N2869		·45T	30‡		R	30s.
	2N456A		·43T	150‡		T	under
	TI3027-31		·2	150‡		T	£1
H.F. amp./osc.	2N700		500	0·75	Power gain 20db min. n.f. 10db at 70 Mc/s	M	
H.F. and V.H.F. amp./osc.	2N707		600M	0·3	Min. 200mW out with power gain 6db at 100 Mc/s	M	50s.
V.H.F. and U.H.F. small signal amplifier	2N384		100αT			R	12s. 6d.
	2N1177		140αT			R	
	2N1225		100αT			R	or
	2N1396		100αT			R	
	GM290, A		700T	0·075	n.f. <9db at 800 Mc/s	T	less
	GM378, A		400	0·075	n.f. <5·5db at 200 Mc/s	T	

Power dissipation is quoted at 25°C air temperature.
When marked ‡ (on power types) the dissipation refers to case temperature, i.e. a heat sink must be used.
α indicates Fα T means typical M indicates F max
Manufacturers are: Electroniques, Motorola, RCA, and Texas.

cerned, as they all invite enquiries. The terms are normally cash with order, plus a charge for postage and packing. Electroniques have a standard p. & p. charge of 3s. 6d. and two have a minimum order.

Club and society officials should note that collective orders would be appreciated. W.E.L. Components Ltd. say they would consider giving discount on "fairly small collective orders." No doubt some of the others would do the same if you approach them.

Two of the firms, Hewlett-Packard Ltd. and Microwave Associates Ltd., do not make any ordinary transistors or diodes. Their line is a rather specialized group of solid state devices. Both make microwave mixer diodes and M.A. make varactors and tunnel diodes too. Admittedly, these are sophisticated items and may seem way above the fellow who is only just getting used to the idea of transistors. They have been included here in the hope that there are a few amateurs able and willing to make use of them. Both firms will supply application information on request.

The Products

Tables 2 and 3 deal with germanium and silicon transistors respectively, in some detail. Some of the commonest types are listed, with an indication of the job you might use them

TABLE 3

SILICON TRANSISTORS

Function	Type	Pol.	F_T(min)	P_D	Performance	Manufacturer	Price
L.F. small signal	2S301-5	*p-n-p*		0·3W		T	5s.
	2S321-5			0·3		T	
	2S3010, 20, 21, 30, 40			0·3		T	to
	2S3210, 20, 21, 30, 40.			0·3		T	£1
	† 2N3707	*n-p-n*		0·25	n.f. <6db where bandwidth 15·7 kc/s	T	
	† 2N3708-11			0·25		T	5s.
	2N3241-2		60T Mc/s	0·5		R	
	2N4074			0·5		R	or
	40231-4		60T	0·5		R	
	40397-9		90T	0·5		R	less
	2N929		30	0·3	Low noise to 30 Mc/s	AEFMSTTr	£1
	2N930		30	0·3	High β at $I_c = 10\mu A$	AEFMSTTr	or
	2S501-3		30	0·3		T	less
L.F. medium power	† 2N3704-6	*n-p-n*	100	0·3	complementary	T	7s.
	† 2N3702-3	*p-n-p*	100	0·3		T	
	† 2N3903-4	*n-p-n*	250	0·3	complementary	M	or
	† 2N3905-6	*p-n-p*	250	0·3		M	less
H.F. small signal	† MPS2923-5	*p-n-p*	120T	0·2		M	
	2S102-4	*n-p-n*	150	0·4		T	
	2S731-3		30	0·4		T	7s.
	ZT402-4		70	0·3		F	
H.F. medium power	2N696		40	0·6		AFHTTr	
	2N697		50	0·6		AFHMSTTr	to
	2N698		40	0·8		AFHTTr	
	2N1613		60	0·8		AEFHMRSTTr	
	2N1711		70	0·8		AEFHMRSTTr	18s.
	2N1893		50	0·8		AEHSTTr	
H.F. high power	2N3053		100	5‡		FRTr	6s. 6d.
	2N699		50T	2‡		RTr	10s. 6d.
	2N1491		180	3‡	V_{CBO} max 30	R	12s.
	2N1492		180	3‡	V_{CBO} max 60	R	to
	2N1493		180	3‡	V_{CBO} max 100	R	47s.
H.F. and V.H.F.	† 2N3983 (TI407)		450	0·2		T	
	† 2N3984 (TI408)		300	0·2		T	5s.
	† 2N3985 (TI409)		300	0·2		T	or
	† MPS706		200	0·3		M	less
Fast switches. Can be used as above	2N706		200	0·3		AEFHMTTr	
	2N706A		200	0·3		AEFHMTTr	
	2N706B		200	0·3	characterised for r.f.	HMTr	5s.
	2N708		300	0·36		AEFHMTTr	
	2N753		250	0·3		AFHMTTr	to
	2S131		220	0·3		T	
	2S512		250	0·3		T	8s.
	2N2368		400	0·36		AEFHTTr	10s.
	2N2369		500	0·36		AEFHMSTTr	to
	2N2369A		500	0·36		EFHRSTTr	14s.
H.F. and V.H.F. medium power	2N2217-9		250	0·8		HMTTr	20s.
	2N2220-2		250	0·5		HMTTr	to
V.H.F. and U.H.F. small signal	† MPS918		600	0·2		M	
	2N918		600	0·2	n.f.6db G15db at 200 Mc/s	AFMRSTTr	
	2N2708		700		n.f.8·5db G15db at 200 Mc/s	FR	32s. 6d.
	2N3600		850	0·2	n.f. 4·5db at 200 Mc/s	FR	

SILICON TRANSISTORS

Function	Type	Pol.	F_T(min)	P_D	Performance	Manufacturer	Price
	2N3478		900		n.f.5db G12db at 470 Mc/s	R	
	2N3932		750		n.f.4·5 G11·5 at 200 Mc/s	R	15s.
	2N3933		750		n.f.4db G14db at 200 Mc/s	R	
	2N2857		1000		n.f.4·5 G12·5 at 450 Mc/s	FR	£3
V.H.F. and U.H.F. high power	2N2631		200T	8·75‡	7·5W at 50 Mc/s 3W at 150 Mc/s	FR	30s.
	2N3118		250T	4‡		RTr	to
	2N3866		800T	5‡	1W at 400 Mc/s	FR	35s.
	2N3553		500T	7‡		EFMR	45s.
Unijunction sawtooth osc.	TIS43					T	10s.
	2N2160					AT	13s. 6d.
FET H.F. and V.H.F. low cross mod. mixer or r.f. amp.	† 2N3819					T	£1
	† TIS34					T	32s. 6d.
	2N3823				low noise	T	£3 15s.

† plastic encapsulation T, typical
Power dissipation is quoted at 25°C air temperature. When marked‡ (on power types) the dissipation refers to case temperature, i.e., a heat sink must be used.
Manufacturers are: AEI, Electroniques, Ferranti, Hughes, Motorola, RCA, SGS-Fairchild, Texas and Transitron.

for, which manufacturers make them, and approximately how much they cost at the time of writing (December, 1966).

These lists are the result of a few hours browsing through the mountain of catalogues. They are but a small sample of the treasures to be found in any one of these beautiful books. To produce a fully comprehensive analysis of such a wide range would employ the total resources of headquarters for weeks, and need a full volume of BULLETINS to publish it. This little collection is offered merely as an introduction to encourage further exploration.

The aim has been to make it as simple as possible, and so ratings and characteristics data have been kept to a minimum. Performance figures are included where they are particularly interesting. Plastic encapsulation is indicated because these transistors are cheap.

The prices given are only an indication as the list prices vary markedly, occasionally more than two to one! As transistor prices are falling steadily the quoted ones tend towards the cheaper end of the scale.

Germanium or Silicon?

The earliest transistors were germanium *p-n-p* grown junction types. You may have some of these (they are available on the surplus market), but those manufacturers who make germanium transistors now, produce mainly alloyed types. They are generally cheap and are adequate for a number of jobs. They also give better v.h.f. noise figures.

Most modern transistors are silicon, usually *n-p-n*. There is a wide range of reasonably priced planar devices. The reduced temperature sensitivity of silicon is an advantage particularly for hybrid valve/transistor equipment.

Performance and reliability are being constantly improved as transistor construction increases in complexity. Consequently the newer ones, germanium or silicon, tend to be superior, but cost more.

Selection

Switching transistors are specifically designed for digital computer work and, except in electronic keyers, have no comparable Amateur Radio application. It is possible to use these transistors for other things and in non-critical situations a 2N706 for instance may be recommended simply because it is cheap.

R.f. amplifiers are designed to give a high gain and sometimes a good noise figure too, at radio frequencies. This tends to raise input capacitance and lower the low frequency gain so they are not ideal for wideband or lower frequency applications. All the same some r.f. transistors are much lower noise audio devices than early a.f. transistors.

Transistors with voltage or current variable gain, designed for a.g.c., are not suitable for any other type of service.

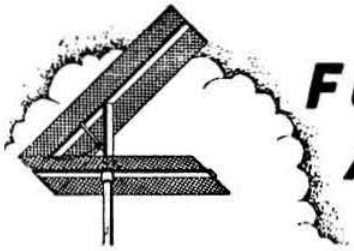
L.f. amplifiers are designed to give a high gain and either good noise figure or power output in the audio range. Owing to the requirement of low phase shift when a large amount of negative feedback is applied, the frequency response must extend to the low radio frequencies, so that many of the modern audio types will work at 1·8 Mc/s or even 3·5 Mc/s, but with the older types, getting an 807 to work at 435 Mc/s might be easier.

Equivalents

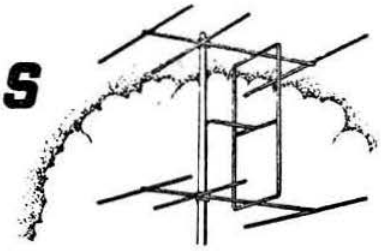
Most manufacturers publish a list of " equivalent " types, but these should be used with care. They indicate similar transistors, not identical ones. Reference to specification data will show how closely related any two " equivalents " really are. In general use the one may be just as satisfactory as the other but it is not safe to assume that the substitution will work the other way round without first checking the data.

Acknowledgements

The writer wishes to thank all the Sales Managers of the companies concerned, who so generously supplied catalogues and information which provided the material for this article.



FOUR METRES AND DOWN



By JACK HUM, G5UM*

Three in a Row

TO have three v.h.f. conventions on three successive Saturdays might seem like an embarrassment of riches. It might also seem like an expression of the nation-wide interest which v.h.f. holds for a large and ever increasing number of the radio amateurs of the British Isles. No, not "might seem," but IS! At the risk of appearing partisan, we would venture the thought: In what other area of Amateur Radio activity could this happen?

To business: the first of the conventions comes on 29 April, and is the subject of the box on page 159. After the immense success of the Midland's first ever at Wolverhampton last year there simply *had* to be another, and at the same spacious and satisfying venue.

Then on Saturday, 6 May, at the Carlton Hotel, North Bridge, Edinburgh, the Scottish v.h.f. men will be getting together, with, we wouldn't mind betting, a fair sprinkling from across the border. Appropriately, Fraser Shepherd, Council Member and GM3EGW, will represent the Society. George Millar, GM3UM, has all arrangements in hand.

In reverse, here's hoping that a goodly contingent of GMs will trek *south* of the border for the London Convention on Saturday, 13 May (they usually do). And, of course, for Midlands men, their appetites whetted by the 29 April "do," the London venue is an easy drive down the M1, or a quick journey "up" by train.

For London's Thirteenth Annual International V.H.F./U.H.F. Convention at its new room-to-breathe centre at Whitton the customary slap-up arrangements are envisaged: talks on FETs, varactors and how to get going on that next band up (2400 Mc/s), with an AEI film in between, followed as tradition has it by the evening banquet and giant raffle. Details and booking information next time.

Australia to America on "Two"

The date of 28 November, 1966, will remain a supremely important one in the chronicling of Amateur Radio v.h.f. history by having yielded what is virtually the ultimate in 2m communication—a contact between Australia (VK3ATN at Birchip, Victoria) and America (K2MWA/2, the Crawford Hill V.H.F. club in New Jersey). The station-to-station distance on the Earth's surface is 10,417 statute miles, but of course the signals, being moon-bounced, covered very much more than that.

From the VK end the 150 watt transmitter feeding four stacked rhombics of 340 ft. per leg gave a signal-echo at the New Jersey end of 3db above the noise. The American team had the full kilowatt input and a sixty-foot parabolic reflector behind crossed dipoles-with-reflectors for circular polarization, giving a signal 12db above noise at VK3ATN.

During the contact, lasting six minutes, a prearranged code number was exchanged, and, of course, taped. And just by way of additional confirmation, K6MYC reports hearing both ends of the QSO.

When the ultimate has been achieved it might be thought that all that can be said is "Congratulations all round!" Certainly they are wholeheartedly deserved—but it is worth bearing in mind that there are other bands to conquer, and from what we hear of plans being laid, these too will be persuaded to "give," via the moon.

* * *

One of the Crawford Hills team, Roger Abson, while in the UK recently, visited G3LTF at Chelmsford and was able to hear the tapes which Peter Blair made of the K2MWA signals received by moonbounce in November of 1965. Peter and Roger discussed the possibilities of a US to UK attempt on 432 and 1296 Mc/s via E-M-E.

As well as moonbounce G3LTF makes good use of nearer celestial bodies, the meteor showers, for reflected signal operation, the technique for which has much in common with that called for by E-M-E. During the last Leonids shower he was heard on 2m by SV1AB in Athens, the latest success in a long series of patient and painstaking tests.

Plan for "Four": Six Months' Trial begins on First April

Thanks to some assiduous work by G3HBW and helpers from the Harrow Club it has been possible to "process" the two hundred or so questionnaires about 4m band planning which were returned (they were available at the exhibition and have been applied for in some numbers subsequently from Headquarters).

A total of 196 completed questionnaire forms were analysed by geographical regions to prevent undue emphasis being given to those received from South-East England which has the largest amateur population.

Overall, 77·5 per cent were in favour of a band plan of some sort, with 37 per cent specifically in favour of a c.w. segment at the bottom end. The percentage of those in favour of a band plan rose as high as 90 per cent in South Wales, S.W. England, the East Midlands and East Anglia, but was 66 per cent at its lowest in Scotland. The remainder of the country hovered around 70 to 80 per cent. However, some 42 per cent were in favour of the G3OUF plan previously published, and this national average applied with remarkable consistency throughout the regions. Some very valid comments were made in relation to the problem of TVI, especially in fringe areas and in the Midlands and a very constructive proposal came from Mike Gibbings, G3FDW, which appeared to the V.H.F. Committee to be a fair compromise of all the points made in the many letters received and in the additional notes written on the questionnaire forms. The V.H.F. Committee therefore recommended to Council the institution of the plan for a trial six month period from 1 April, and Council approved it at its February meeting. The band plan is as follows:

Zone 1: 70·1 to 70·15 Mc/s, c.w. only.
Zone 2: 70·15 to 70·35 Mc/s, England and Wales north of a line joining Aberdovey and Gt. Yarmouth.
Zone 3: 70·35 to 70·425 Mc/s, GD, GI, GM and EI.
Zone 4: 70·425 to 70·475 Mc/s, S.W. England, S. Wales, GC.

* 27 Ingarsby Lane, Houghton on the Hill, Leicester. Please send the reports by **15 March** for **April** issue, and **12 April** for the **May** issue.

SECOND MIDLANDS V.H.F./U.H.F. CONVENTION AND DINNER

SATURDAY, 29 APRIL, 1967

GOLTHORNE SUITE,
PARK HALL HOTEL,
GOLDTHORN PARK,
WOLVERHAMPTON

CONVENTION CHAIRMAN,
S. F. BROWN, MIEE, G4LU

Reception will be between Noon and 2 p.m., and talk in stations will be operating from 10 a.m. to guide those who arrive mobile.

There will be Trade Exhibits, Technical Demonstrations, Home Constructed Apparatus Competitions, " Attend as you Please" Lecturettes and lucky programmes. A Grand Raffle and a really superb meal will be provided for those who come to the Dinner. Ladies will be most welcome, particularly at the evening festivities.

The whole Convention is designed to be informal and entertaining, with plenty of comfortable seating for chatting with friends.

Principal guest will be Mr A. D. Patterson, President, RSGB

The Hotel is convenient to get to by road from all directions and there are adequate Car Parking facilities.

Dinner reservations should be made, with remittance, to Don Kirk, G3GTW, 58 High Street, Sedgley, Nr Dudley, Worcs. Seating is limited to 100 places.

CONVENTION TEA & DINNER 35/-
DINNER ONLY 30/-
CONVENTION & TEA ONLY 10/-

Dinner tickets must be booked and paid for in advance, otherwise pay for entrance at Reception.

Further information from Convention Secretary, G6FK, 5 Pinfold Crescent, off Pinfold Lane, Penn, Wolverhampton, Staffs.

Zone 5: 70·475 to 70·65 Mc/s., England south of a line from Yarmouth to the Welsh border.
Zone 6: 70·65 to 70·7 Mc/s., reserved for stations in the TV Channels 4 and 5 areas.

Special Note.—In Zone 2 it is important to keep clear of the Mobile Calling Frequency of 70·26 Mc/s unless actually vehicle-operative. In Zone 3 it is important to keep the RAEN Priority channel clear, viz., 70·375 plus or minus 25 kc/s.

Will all 4m operators do their best to conform to the above plan, hammered out after a great deal of opinion-taking? Those who wish to exchange existing crystals for frequencies in other zones should send particulars to " Four Metres and Down."

Contests Short and Long

The last couple of months have registered two important developments on the v.h.f./u.h.f. contest front.

One of them was the first experience of full use of the new c.w. segment at the low end of " Two " during the 29 January telegraphy contest. Certainly the bottom 100 kc/s had seen c.w. use before, notably during the last V.H.F./NFD but never on the scale of 29 January. If ever vindication of the success of a bandplan were to be required, this was it.

Only one snag: those who did not possess low end crystals found the going hard at first; but before the contest was many serial numbers old it was clear that the whole band was being scanned by the majority of operators, not the whole 2 Mc/s at one swish, but by a sensible " QLM " and " QMH" procedure.

When good T9-keyable v.f.o's come into more widespread use the enjoyment of the January c.w. contest will be enhanced by more co-channel working and much more dodging of the QRM in the packed low 100 kc/s.

Enjoyable though the c.w. contest was, a point made by G3BA provides cause for thought. Tom says: " Much as I applaud the enthusiasm of the lads who go out portable in these contests, it can be frustrating to a nearby fixed station operator to know that he has no chance of winning. If I had been a *real* GW I would have felt very fed-up at having all those ' foreigners ' sitting on my boundary gobbling up 30 points at a time, while those in the valleys were flogging themselves to death to get out at all, never mind win. Several of the GWs were flattened by the mountain top visitors when these were on the same channel.

" Could there not be a separate section for the portable lads to try for? Alternatively, as there are plenty of portable contests when it is legit to go out on the mountains, would it not be better to make the annual 144 Mc/s C.W. Contest a wholly fixed station one? "

* * *

Secondly on the contest front mention must be made of the success which has attended the first " Ninety Minuters," or Cumulative Activity Contests. "All credit to the brain behind the idea," remarks R. A. Ham, BRS15744 of Storrington, in turning in a report that discloses more 70cm stations heard than 2m ones. Of the 18 he logged on 432 Mc/s no fewer than 13 were G8 plus three call-signs, this on 21 January. On the same evening the number of 2m stations logged was 17. An even better score was notched at Storrington during the 4 February " Ninety Minuter": 21 stations (16 G8 plus threes) to well beyond the 100 mile radius.

But to Dave Woodhall, G8ANY, in Blackpool, the Cumulative Activity Contests so far have produced little more than the usual number of signals on the band. During the first two weekend " ninety minuters " he had ten contacts with eight different stations: " On a Sunday morning I can normally hear about a dozen different stations," he says, and goes on to add: " Several of the stations I have worked

V.H.F./U.H.F. BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG*	Craigowl Hill, Dundee	145·985 Mc/s	AI	
GB3CTC	Redruth, Cornwall	144·10 Mc/s	AI	North-East
GB3GI	Strabane, N.I.	145·990 Mc/s	AI	S
GB3GW	Swansea	144·250 Mc/s	AI	E.N.E.
GB3LER	Lerwick	145·995 Mc/s	AI	S
GB3LER	Lerwick	70·305 Mc/s	AI	N/S
GB3LER	Lerwick	29·005 Mc/s	AI	N/S
GB3VHF	Wrotham, Kent	144·50 Mc/s	FI	North-West

*Not operational

RSGB V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham, Kent, when measured by the BBC Frequency Checking Station, was as follows (nominal frequency 144·50 Mc/s):

Date	Time	Error
4 January	10.10 GMT	64 c/s high
11 January	11.15 GMT	50 c/s high
17 January	11.02 GMT	20 c/s low
25 January	12.00 GMT	20 c/s high

didn't know about the Cumulative Activity Contests, so I suggest that you put something about them in the BULLETIN again." This we gladly do, with the reminder that the "Spring" section still has three weekends to run, namely, on 11 and 25 March and on 8 April, 19.30-21.00 GMT on 2m and 21.00-22.30 GMT on 70cm. See December issue, page 839, for full info.

On contest operation by and large a good point is made by G3TND of Somerset to the effect that a minor annoyance is the operator who sends a prolonged CQ before ever announcing his call-sign. The standard formula of three CQs-and-three-call-signs quickly informs the listener whether he should or should not continue to lie in wait.

Heartening news from Cornwall via G3OCB is that at a recent V.H.F. Group meeting down there it was decided that several stations would be set up at different sites to make the most of the various v.h.f. contests in the RSGB calendar. So look out for G2BHW, G3XC, G3IGV and G3OCB on all three bands. For V.H.F. NFD, however, all will combine for a concerted effort from one site. There is no doubt that the rest of the country will align their beams accordingly for what is a rare county for most people.

Turning now to contests in an international sense, the January IARU/V.H.F. Newsletter which Fred Lambeth, G2AIW, has sent along reports the results of the 1966 IARU Region 1 V.H.F. Contest, and discloses very good results by British contestants. This contest has six sections for 2m, 70cm and 23cm, fixed and portable-mobile. "Fixed stations 144 Mc/s" shows G2JF in top place with 50,107 points. In Section 5, which was "Fixed 1296 Mc/s," G3MCS romped away with 997 points, which was 834 points ahead of the runner-up, HB9SV. And top of the 23cm portables was G3OBD/P with 540 points, the runner-up being I1SHF/P with 202 points.

Altogether the contest was a fine example of international getting-together on the air, for which nineteen countries sent in logs, by far the greatest number was from the Czechs.

To Bill Hawthorne, G3MCS, will go a special cup in recognition of his magnificent performance on "Twenty-three" during this event.

Expeditionaries

All who wish to collect GD on 2m and 70cm—and that means a considerable number of those operators who are in search of their RSGB "Four Metres and Down" operating awards for each band—should lose no time in writing to fix schedules with the Cambridge University Wireless Society's Easter Expedition to the Isle of Man.

Operation on both bands will commence on the evening of 18 March from the summit of Snaefell, continuing on successive evenings up to and including 28 March.

The man to write to is Peter K. Cripps, G3SKT, at Queen's College, Cambridge, who says:

"Skeds are considered to be a most important part of the expedition and c.w. is the preferred mode, although 70cm skeds with G8 plus three stations will certainly be welcomed on a.m. or s.s.b. Although the Isle of Man is 300 miles from London, previous experience indicates that even those stations with average locations will be workable on c.w."

Whether on 'phone or c.w., GD6UW/P will be found in that part of 2m and 70cm appropriate to the mode.

Only if there is sufficient demand will equipment be taken for 4m to avoid diluting the effort too much.

* * *

A confirmed expeditionary is R. W. Martin, call-sign G3RWM, whose portable contacts last year ran into many hundreds, very largely on 4m and during the various v.h.f. contests, but remarkable to relate, sustaining a high level of activity right up to Christmas.

Already this year he has been out and about and plans one or more /P every month, probably from certain rare counties not often available on 4m. It would not be inappropriate to drop him a line (with an s.a.e. of course) for news of his next planned expedition and a suggestion for sked-fixing. QTH: 76 St Pauls Crescent, Coleshill, Warwickshire.

* * *

Come July (probably the second week) and the G3BA-G3BHT-G4LU expedition will be on its way to Ireland. Operation on A1 at the l.f. end of "Two" will be complemented by sideband working on 145·4 Mc/s. Times of operation will be 19.00 to 22.00 GMT for c.w., 22.00 to 22.15 GMT for s.s.b., then 22.15 to 23.30 GMT back on the key again. Only if there is an expressed demand will 4m gear be taken along: operation on 70 Mc/s would be after midnight and between 08.00 and 08.30 next morning.

The time to fix skeds for what should be an expedition productive of many new GI counties together with EI is *now*. Tom Douglas, G3BA, invites stamped addressed envelopes to his QTH, 141 Russell Bank Road, Four Oaks, Sutton Coldfield, Warwickshire, and promises that sked lists will be circulated in due course to all who apply.

* * *

Another intending expeditionary is George Davies, G2FXA, whose 3-valve transmitter, and transistor p.s.u. and converter will be contained in two ex-Army haversacks, the aerial in a fishing rod case, the whole (and George) carried on a vintage Velocette. Destination: Captain Cook's Monument, 1064 ft. a.s.l., on the North Yorks moors. Phone and c.w. on 145·8 Mc/s.

Beaconry

The success of the Gibraltar 4m beacon—it has been heard in the UK on several occasions—lends exceptional interest to the proposal to establish a similar beacon at an even greater distance, on Malta, in fact. The hope is that it will be operational by the beginning of May in readiness for summer's sporadic-*E* opportunities.

Using the call-sign **9H1MB**, the Malta beacon will radiate on 70·1 Mc/s. The equipment will consist of a modified Pye PTC703Z transmitter giving 15 watts of r.f. into a J-Beam 4-element Yagi, the feeder being Uniradio 1 generously supplied by BICC Ltd. An ex-RAF automatic keying device will be used.

All this will shortly arrive in Malta where Howard

Cunningham, 9H1A/G8FG, will be taking over, while 9H1R will be responsible for the care and running of the beacon. The exact location on the island will be notified when known (watch GB2RS for further news).

Other beacon news:

GB3GW: has already been heard at a considerable distance well into England. Its frequency of 144·25 Mc/s displays a shift of up to 1 kc/s during the keying cycle.

GB3ANG: off the air for the time being until a new transmitter is completed for it. Plans are in hand to establish a 4m beacon here at a later date.

GB3GEC: off the air indefinitely.

GB3LER: (29·005, 70·305, 145·995 Mc/s): The Lerwick " beacon keeper," Ray Flavell, GM3LTP, is expected to leave Shetland during the year and alternative arrangements will need to be made for the maintenance of GB3LER. It is hoped, in view of the great value of this beacon station, to keep the service running with the aid of other amateurs resident in Shetland.

GB3CTC: still on 144·1 Mc/s but operating at reduced output during modifications with 70cm in view.

Sheffield: The RSGB Council has accepted in principle the offer of the University of Sheffield Radio Society to operate a beacon probably from the top of the University building. Application for a licence is being made to the GPO. It is hoped to radiate in the 70, 144 and 432 Mc/s bands.

To round off this section one ought to add that beacons don't just run themselves, even though, chugging away 24 hours a day, they may appear to do so. Each of those for which the Society is responsible has its own " beacon keeper," a local member (sometimes members) prepared not simply to do routine checks and maintenance but to restore service if transmission should fail—rarely enough, but bound to be on a wet and windy night when it *does* happen.

With this voluntary help and the co-operation of a number of suppliers, the RSGB v.h.f. beacon chain provides a service-value out of all proportion to its very modest cost.

On the U.H.F. Front

Coming as they did after many weeks of quite normal conditions, the openings during January and February were much appreciated, and, as often seems to happen, gave a " lift " to 70cm as well as to 2m and 4m. What was particularly encouraging to note was that they assisted propagation on 23cm; in Birmingham G8ABP, prompted by several S9 contacts with the Home Counties on 70cm, turned his attention to 1296 Mc/s, and up came G3MCS at RS56 and G3GWL at RST539 over path distances of 62 and 56 miles respectively. The aerial was a home-built 3 ft. dish feeding a K6AXN converter.

Near Chelmsford, G3LTF—he rewarded many stations up-country with useful DX contacts during the recent 70cm openings—is ready to assess the effect of aurorae on that band. He keeps a 6·09 Mc/s receiver monitoring Radio Luxembourg for Dellinger fade-outs and consequent warning, 26 hours ahead, of a possible auroral opening at v.h.f. This receiver feeds a pen recorder and alarm system. " During major aurorae in future I will transmit on 2m and 433 Mc/s to try for " A " contacts on the latter band " says Peter.

Another interesting comment from G3LTF in the light of the present interest in varactors is that these devices have been used by the Mid Essex U.H.F./V.H.F. Contest Group on 70cm and 23cm for the last three years, bringing them to top place on 70cm during V.H.F./NFD on at least one occasion. As far back as 1964 while testing the group's 70cm unit, Peter worked SM7 at RST569. His first varactor contact was with G3NOX/T in 1963, using, as G3LTF puts it, " a beat up old MA4280 with an f.m. input from 2m "

Pockets of 23cm activity continue to establish themselves, or, where they exist, to fill up. This is a good thing, for 1296 Mc/s can be discouraging to the worker remote from fellow u.h.f. enthusiasts. So when half a dozen people along the Lancashire coast, plus a few more inland, are known to be operative or near operative on the band, as G8ANY of Blackpool reports, then there is promise of some firm results. As always, the great thing is to concentrate activity into set periods to give members encouragement to switch on in the certainty that somebody will be there, starting on 70cm and transferring to 23cm as appropriate.

In another conurbation, the Tees-Tyne one, u.h.f.-equipped stations are sufficiently close to one another, if not always favoured geographically, to promote an increasing level of activity. Already G2FXA at Stockton has a 23cm converter commissioned, along with an 8-over 8-slot, and a parabola in hand. He would be very pleased indeed to co-operate in any 23cm to 70cm crossband tests.

"Then and Now" Corner

In the early days of 2m one of the most impeccably shaped and alluringly rhythmical Morse signals to be heard on the band was that which spelled out the call-sign " G2NH." In 1953 its owner, Ernie Dedman of New Malden in Surrey, quitted 2m to go s.s.b. on the lower frequencies.

And now, in turning in his first report to this page for thirteen years, Ernie announces that he is back on the band with a 4X150 s.s.b. and c.w. rig. Comparing conditions of operating then and now he says he is amazed at the lack of c.w. signals to be heard, except during contests. Today, as in the early days, the number of S2/3 signals which can be heard as unresolvable carriers yet which would be quite workable if keyed, remains as high as ever.

Another old-timer (he will be forty years licensed this autumn), Fred Ingleton of Staines, G6FI, casts his mind back even further to the year 1923, when you would hardly think that anything remotely resembling v.h.f. existed. Yet an extract from *Modern Wireless* which Fred has sent along suggests that, like the Yagi aerial which was patented at much the same time, " there's nothing new. . . ." This " M.W." extract reads:

" At Inchkeith in the Firth of Forth is a ' wireless lighthouse.' A focused beam transmitter, which revolves once every two minutes, sends out a different letter for each half point of the compass. In this case a spark transmitter is used, the wavelength being four metres. The receiving aerial, placed on the bridge of the ship, is a length of wire measuring only two metres. Yet with a single valve receiver good signals can be obtained up to a distance of ten miles."

As " Freddie Ink " observes: " I wonder if it was realized that the receiving aerial was near enough a half wave? And I'd like to know more about that one valve receiver! "

The Verification Problem

Endorsing the suggestion by G3FDW that contest logs should be used as confirmation of contacts for the " Four Metres and Down " certificate, G2NH says that this would be " tremendous help to all those starting out now to collect the necessary cards," and goes on to put the following proposition:

If, says Ernie, a competitor wished to avail himself of Contest logs, he should submit his own contest entry in duplicate, together with a stamped addressed envelope. After the Contests Committee had completed their log-checking they need do no more than endorse the duplicate log with a signature (after eliminating any contacts that were not confirmed) and return it to the contestant for eventual submission as a certificate claim.

" I can appreciate that the work the Contests Committee would be faced with in having to eliminate unconfirmed contacts," concludes G2NH, " but perhaps someone will have a bright idea as to how this work would be reduced."

On the subject of QSLing in general a comment by G3RWM will be endorsed by many: "One complaint on QSLs is lack of! Even when my card is sent off direct and accompanied by a stamped addressed envelope! May the electronic gremlins lurk in the rigs of the non-repliers until they also QSL in return!"

Tech Corner

From G3NNG (C. L. Desborough, Faringdon, Berks):

Here are a few thoughts on the subject of field effect transistors, following the completion of an FET converter at G3NNG. This uses the TIS34 by Texas, the plastic encapsulation version of the 2N3823, costing about 25s. at the moment.

An FET is normally unstable in the grounded source mode when used at v.h.f., but is stable under all conditions in grounded gate, while the maximum gain remains virtually the same as with neutralized source but without the added complications. A circuit diagram of a grounded gate r.f. amplifier is given, Fig. 1 showing the 2m version and Fig. 2 that for 70cm.

Evaluated under amateur conditions at home, two TIS34 in cascade (grounded gate) at 144 Mc/s gave a noise factor which appeared to be better than any bi-polar device. At 432 Mc/s the noise factor of an FET preamp appeared to be about the same as with an AF239, though the power gain was some 6db down. The official claimed gain for the TIS34 at 500 Mc/s is 11db with an n.f. of 4·5db.

On FETs generally one sometimes hears enthusiastic claims made for them in respect of cross-modulation characteristics. Cross-mod is a function of unwanted input *voltages*. Therefore, to achieve optimum cross-modulation performance for a given gate-source characteristic one should use grounded gate and step the input voltage *down* to feed into, say, 150 ohms. This problem is most in evidence at the tunable i.f. where signals are fairly large.

More enlightenment is also needed in respect of mixers, and mixer injection levels. In layman's terms one wants to swing the input characteristic (gate/source) between pinch-off and zero bias. Insufficient drive reduces gain: too much puts in noise and gives square-waves of drain current.

I have found a fairly foolproof system with FETs (or bi-polars for that matter) is to increase the local oscillator drive until drain current just starts to rise, and that's it. The same *voltage* swing to achieve this is required whether you drive the source or gate, but because of the difference in impedances (say 150 ohms to 10K at v.h.f.) much more local oscillator power is required to inject in the source (approximately 8mW). This order of power is not a serious problem but it means that local oscillator injection should not contain any harmonic frequencies.

Personally, with regard to mixers, I have always used multiplicative mixing with the signal to gate and the local oscillator to source and find gain about 3db lower than with good bi-polar devices but n.f. noticeably better.

From G6JP (George Jessop, Pinner, Middlesex):

The performance of the varactor tripler for 70cm described in the November issue of the BULLETIN has been more fully checked by G3HBW.

From these tests the linearity between input and output of the BAY96 used in the prototype is confirmed and the power output of 10 watts for a drive of 15 watts is also confirmed.

The tests called for the application of drive to the varactor at low, medium and high points in the 2m band, namely, 144·0, 144·9 and 145·29 Mc/s, and the plotting of the varactor output on 70cm. The results are as shown in the first graph, Fig. 3. The second graph, Fig. 4, depicts driver output against varactor output optimized at each drive level (dash line) and at the 15 watt drive level only (solid line).

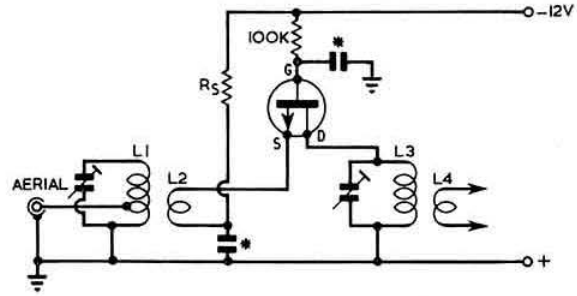


Fig. 1. An FET amplifier for 2m used by G3NNG. The inductors L1 and L3 should resonate at 144 Mc/s when tuned with a 2-8 pF capacitor, i.e., they require about 6 turns on a ¼ in. former. L2 and L4 are 1-turn link couplings. Capacitors asterisked are feedthroughs of around 500 pF value. The value of Rs should be chosen to pass 4 mA when a TIS34 is used.

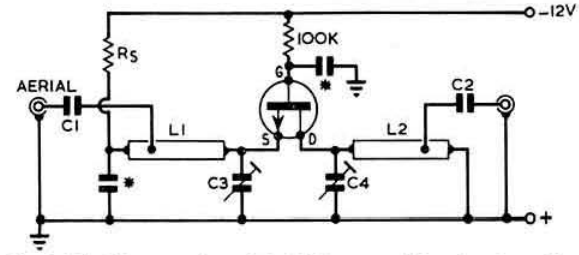


Fig. 2. The 70cm version of the FET preamplifier developed by G3NNG. The inductors are quarter-wave tuned lines in a 1 in. cube box constructed of double sided copper clad board. It is important that the input and output circuits should be well screened from one another. The input and output coupling capacitors C1 and C2 can be of about 47 pF, tapped well down each line; C3, C4 2-8 pF trimmers.

From G3LTF (Peter Blair, Chelmsford):

Further to comments about varactor tuning, it is certainly true, as has been mentioned, that the idler adjustment is critical for good linearity when using a.m. procedures. Align it at full power for best power output at the required frequency. Then reduce power to one quarter of this, to allow for 100 per cent modulation. Finally, adjust the idler for best linearity and speech quality, preferably by means of a duplex set-up with someone local.

Skeds Wanted

By **G3VXK:** with any 70cm stations in Gloucestershire and Somerset, either phone or c.w. Write Richard Porter, c/o Students' Union, University of Liverpool, 2 Bedford Street North, Liverpool 7.

By **G8ABP:** with any 70cm stations in the counties of Westmorland, Northumberland and Cornwall.

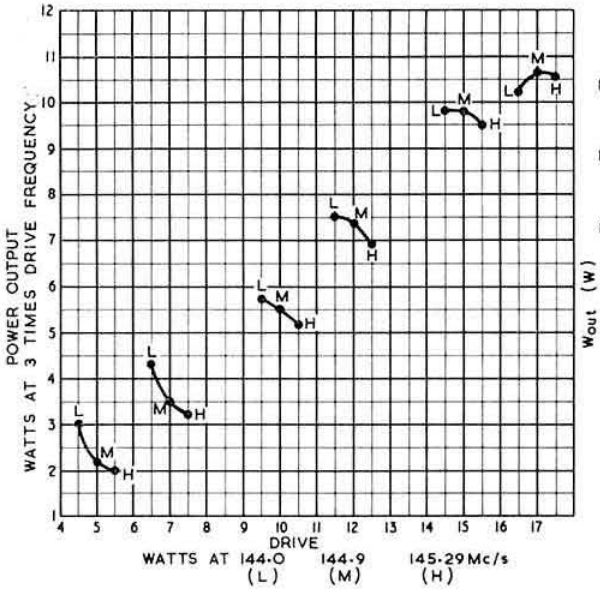
By **G3LTF:** with any 2m stations beyond 300 miles from Chelmsford, in any direction except due west.

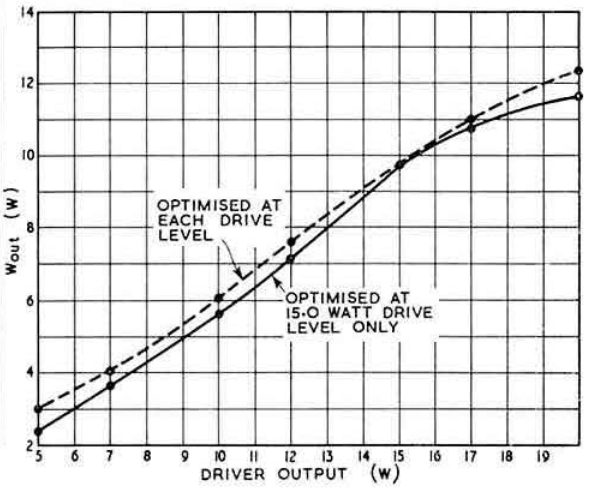
By **G3BA:** with any 2m s.s.b. stations anytime, anywhere, but particularly GI, Lancashire, EI, GM and GD, on 145·41 Mc/s.

By **G3GGK, G3HZP:** with any mobiles in or around Cambridge, especially at going home times. Both equipped 70·26 Mc/s.

Skeds Operative

Daily at 18·30 GMT, **PA0LB** to G3MED and other London area s.s.b. stations; on 145·1 Mc/s at the moment





Figs. 3 and 4. Performance figures for the G6JP Varactor tripler for 70cm described in the accompanying note.

by reason of TVI problems at the PA end on the international s.s.b. frequency of 145·41 Mc/s.

Nightly at 22.00 to 23.00 GMT, **G3LTF** on 144.01 Mc/s c.w., calls CQ to the N, W, E, and NW, for DX telegraphy contacts.

Here and There

" It was most pleasing to read G3BA's comments on operating standards (" Letters to the Editor," January issue). What is often a tedious marginal contact over a long or difficult u.h.f. path could often be made quite pleasant by the use of break-in . . . but please let it be used like a telephone and not say ' break ' every two or three words. I have had PTT on my 70cm transmitter as long as I have been operating but as yet have found only one 70cm station who will play. . . ."—G8AEX.

* * *

" A hint to the G8-plus-three lads that their QSL Sub-bureau shelves need a clearance. Call it a spring sale! But many are good and keep stamped addressed envelopes in stock ready for QSLs addressed to them."—G6QM (the G6 and G8 QSL Bureau sub-manager). And if you want to send him some SAEs his address is 62 Ashlands Road, Cheltenham.

* * *

" Uncle Mike was a bit out in his bearings when he called the Winning Post Hotel a ' Thames side location.' The Thames is about five miles away! "—G6FI.

* * *

" I have read the new rules for the next V.H.F. NFD with great interest, and would like to express my pleasure at seeing that the suggestion regarding three station entries has found support."—G3TND.

* * *

Final: We said last time, " Keep 2m busy: you never know when you'll find an aurora." Many did, first week of February. The GMs with spark-sounding notes were worked at least as far south as Cambridge (G3EDD) and three heard in quick succession by G3GGK. It was a fleeting opening—but others may develop any time.

MOBILE RALLIES

30 April ..... **Medway Mobile Rally**
British Uralite Ltd., Higham, Nr. Rochester, Kent.
Organized by the Medway Amateur Receiving and Transmitting Society.

30 April ..... **North Midlands Mobile Rally**
Drayton Manor Park, ½ mile South of Fazeley, near Tamworth.
Organized by the Midland Amateur Radio Society.

7 May ..... **Thanet Radio Society**
Cliff-top site, by the Viking Ship, Pegwell Bay, Ramsgate.
Organized by the Thanet Radio Society.

11 June..... **Medway Mobile Rally**
Mote House, Mote Park, Maidstone, Kent.
Organized by the Medway Amateur Radio Mobile Rally Committee.

18 June ... **Hunstanton Annual Bucket and Spade Party**
Brookes Refreshment Rooms, the Car Park, opposite the railway station.

9 July..... **RSGB National Mobile Rally**
Gilwell Park, Chingford, NE London.
(Overnight camping is permitted on the site)
Organized by the Radio Society of Great Britain.

23 July ..... **Cornish Mobile Rally**
Pentire Head, Newquay, Cornwall.
Organised by the Cornish Radio Amateur Club.

3 September ..... **Swindon Mobile Rally**
Lydiard Park, near Swindon, Wilts.
Organized by the Swindon and District Radio Club.

7-8 October ..... **RAEN Rally**
Details to follow shortly.

THE MONTH ON THE AIR

By JOHN ALLAWAY G3FKM

THOSE of us who do not always obtain immediate replies from the stations we are calling might reflect that the world's Amateur Radio population is increasing by leaps and bounds. Figures disclosed by the latest issues of the *Radio Amateur Callbook* show that total licensees in the top ten countries listed are as follows: USA 266,522, Great Britain 13,584, Argentine 11,861, Canada 11,616, Germany 10,796, Japan 10,515, Brazil 8404, Australia 5018, New Zealand 3445, and Sweden 3273. This means that next to the USA the largest number of amateurs is in the UK. A careful listen around the h.f. bands would cause one to doubt that these figures are true since there never seem to be many British stations active! Unfortunately figures for the USSR and Eastern European countries are not available but their " activity rate " must be many times greater than our own. In a recent issue of the *DX'er's Magazine*, Gus, W4BPD, who is one of the world's most travelled DXpeditioners discussed the world's " most DX minded country " in the light of his experiences. Surprisingly enough he decided that it was most likely Japan. Germany also came high in his list, with the UK near the bottom.

Bert, VK2AGW, who has just returned home from a visit to Europe, is now very active on 14 and 21 Mc/s s.s.b. He was first licensed as 2KG in 1919 and now holds the more up-to-date UK call G3BHG. QSOs with G are one of Bert's chief interests on the air.

A local Midland parish magazine—*Enterprise*—contains the news that 35 Warwickshire senior Scouts and Rovers are going on a three week trip to the Spanish Sahara. They will be going in two five-ton Army type trucks and have been loaned " short wave radio equipment so that progress reports can be sent home." They intend to try to get permission to enter Ifni. It will be interesting to see whether the local authorities will in fact give permission for the radio gear to be used, and if they do, it is to be hoped that the Scouts are capable of dealing with the pile-up of those needing contacts with Rio do Oro!

More senior readers who remember MF2AA (Trieste) just after the last World War will be interested to know that he is now none other than MP4BCC.

Top Band News

Readers will be interested to know that G3UPK will be on the air from Gibraltar again this Easter with the call-sign ZB2AY. He will be arriving on 18 March and should be there for some six weeks. He worked a number of UK stations on c.w. at Christmas, but hopes to give s.s.b. a try this time.

G3SED reports that from the day that Stew, W1BB, returned home and came on the band conditions took an immediate turn for the better. Stations heard on the week-end of 21/22 January include ZD8J, W1FZJ/KP4, K5XL, and, of course, W1BB/1! With an inverted Vee at 60 ft. over an earth mat about half a square mile in area Mike undoubtedly puts out one of the best 160m signals from the UK.

Preliminary reports of the *CQ* **WW 160m Contest** suggest that conditions were quite good. GM3IGW/A managed to contact 16 countries and had 13 transatlantic QSOs, the best of which was with HI8XAL at 05.50. OK/OL stations totalling 50 were worked, and good signals were heard from ZD8J and ZB2AM, but both got away. Weather conditions prevented use of the 200 ft. balloon supported vertical for more than an hour, but in that time W signals peaked at S7—as the wind blew the aerial into a near horizontal plane these signals faded right out. This all took place between 22.30 and 23.30.

Congratulations to GM3IAA on what is believed to be the first Top Band contact between Scotland and Malta. Jim managed a QSO with 9H1AE on 3 February. He asks why is it that everybody crowds on to the l.f. end of 160, instead of using some of the quieter parts of the band.

News from Overseas

An interesting letter has been received from ZD8RB (ex-G3VGW), Ascension Island, concerning present amateur activity on the island. Dick is presently on the air on 10, 15, 20 and 40m, using a KW Vespa transmitter and a Racal receiver. He finds that his ground plane and wire aerials are not getting him into the UK as well as he would wish, and says that 15 has gone off as far as European contacts are concerned—the best time now seems to be around 12.00. There appears to be good propagation to Europe on 7040 kc/s s.s.b. at around 21.00. Top Band has also been combed for signals, but so far no amateur signals have been heard. Dick says that he will be pleased to arrange skeds and that he will be on 160m nightly at around 01.00. His address is: R. I. Buckby, c/o BBC, Ascension AAFB, Patrick AFB, Florida, USA. This address will also reach ZD8PMG and ZD8RC who are on the BBC staff. ZD8WZ has now returned to his home call—W4IIR, and ZD8SK1 and ZD8J are the most active of the US contingent.

Apparently G3LZN was incorrect in thinking that he might be the first to be granted a South African licence under the new reciprocal licensing arrangements. G3AAE was issued with permission to operate as G3AAE/P/ZS on 24 August, and had his first contact from ZS on 12 September. Other interesting facts are that John was not required to take out a receiving licence or make any other payment, nor was any power restriction put on his operation! The South African Post Office confirm that this was the first reciprocal licence issued.

9V1LK finds conditions between Singapore and Europe rather poor just now. He often hears VKs working Gs but cannot hear the UK himself. 14 Mc/s has been closed to Europe after about 13.30 during January. 7 Mc/s has been a much more reliable path to the UK around 18.00, but Dick complains that too few appear to really be searching for the weaker DX signals in amongst all the rubbish. It is suggested that a little " digging " around 7010 and 7020 (each plus or minus 2 kc/s) at 18.00 might result in a contact with 9V1LK.

VP8HJ reports that VP8JF will shortly replace VP8IY on Adelaide Is, Antarctica. VP8IQ is now off the air and has no gear at present. VP8IE is still on South Georgia and has now received his equipment but it is not known whether he has been active yet. Both VP8IN and VP8IZ will be returning

*10 Knightlow Road, Birmingham 17. Please send all reports to arrive by **15 March** for the **April** issue, **12 April** for the **May** issue, and **17 May** for the **June** issue.

THIRD LONDON S.S.B. DINNER

SATURDAY, 20 MAY, 1967

ROYAL GARDEN HOTEL
KENSINGTON, LONDON, W8

An entire floor has been reserved. From 3.30 p.m. there will be an informal display of s.s.b. equipment.
The dinner at 7 p.m. will be followed by dancing, a cabaret, and a raffle of s.s.b. equipment. Late night refreshments will be provided before the close at 1 a.m.
Many overseas visitors are expected, including a party of Ex-G Radio Club members from the USA.
Enquiries regarding hotel accommodation for those wishing to stay in London overnight should be sent to Mr J. C Farlow, G3BXI, 49 Mount Pleasant Road, Chigwell, Essex.

DEMAND FOR TICKETS IS HEAVY SO PLEASE BOOK EARLY. ENQUIRIES TO MR N. A. S. FITCH, G3FPK, 79 MURCHISON ROAD, LONDON, E10. TICKETS 75s. PER PERSON

home to the UK soon. Your scribe recently contacted VP8JD who is with the British Antarctic Survey team in the South Orkney Is, and who was trying out his a.m. VP8JG, Stonington Is, Antarctica, is now QRT.

9J2BC finds the bands rather poor in Zambia at the moment and hopes that things will improve for BERU which he hopes to enter. He has managed to work ZL4GA recently; it appears that ZL signals are quite rare in the Southern part of Africa.

DXCC Notes

Official Bulletin No. 95 from ARRL Headquarters announces the addition of **Farquhar Is.** to the ARRL Countries list. Contacts with stations on Farquhar Is. made since 10 November, 1965 will count for this country. QSL cards may be submitted now for DXCC credit.

Rumours that the operation by K1IMP and W9WNV from K1IMP/KC4 (Navassa Is.) will not receive credit for DXCC are as yet not officially confirmed. According to reports received over the air some slight irregularity may have occurred concerning whose responsibility it is to issue permission to operate from Navassa.

Awards

The Association Royale des Radio-Amateurs du Maroc has announced its "**Diploma de la ville de Rabat.**" This is to be awarded to any amateur or listener who has contacted or logged at least 10 stations in the city of Rabat since 1 January, 1966 (Applicants outside Europe and Africa need only five). Any mode or band may be used. A list of contacts showing time, date, frequency, report and call-sign of each station should be sent together with 10 IRC's to: CN8CB, PO Box 299, Rabat, Morocco. The ARRAM will check to see whether the stations listed have received the applicant's QSL. The following CN8s are known to be in Rabat: AA, AB, AC, AM, BB, BC, BH, BV, BW, CB, CC, CH, DI, EA, EL, EU, LH, MH, MN, MT, NZ.

Latest information on the **WAVO Award** has been received from the Society of Newfoundland Radio Amateurs. This sheepskin is available to those who can produce proof of having contacted at least 20 stations in Newfoundland or Labrador since 1 June 1946. It is pointed out that contacts signing 3B1, 3B2, VO1 or VO2 are valid—but a station may only be counted once whether contacted as a VO or a 3B. The minimum report for valid QSOs is "readibility 3." The appropriate QSLs should be sent with an s.a.e. and sufficient postage for the return of the cards—it is suggested that five IRCs be sent if return by registered mail is desired —to: Awards Committee, Society of Newfoundland Radio Amateurs, PO Box 1226, St John's, Newfoundland, Canada.

The **Radio Club de Sevran (France), F5KD,** will be issuing a special QSL card to those who contact or hear their station during the period 19.00 1 April to 19.00 2 April, on c.w. or phone on any band 3·5 to 21 Mc/s. This is to celebrate the club's first anniversary. QSLs and SWL reports should be sent to: Radio-Club de Sevran, F5KD, Mairie, 93 Sevran, France.

DXpeditions

W4CHA has now arrived on **Norfolk Is.** and has been very active with his VK2BRJ/9 call on c.w. Although expected to appear around 14,065 kc/s, Bob has also been found around 14,045 kc/s. Unconfirmed rumours suggest that other rare spots in the vicinity may be visited in due course, places mentioned including Lord Howe Island, Nauru and Christmas Island.

Interest in expeditions to Clipperton Is. (FO8) seems to be increasing. K7GHZ/7 is reported to be interested in making up a party to go there with him in his 25 ft. cabin cruiser this summer.

G3BID was due to leave for **Gambia** in early February and should have been on as ZD3F. Some /M operation was expected to take place, and G3BID/6W8/M operation was also a possibility. G3RDX is accompanying Edgar and may also have a ZD3 call.

The Cambridge University Wireless Society will once again be making an expedition to the **Isle of Man** at Easter time. They will operate from a boarding house in Douglas

QTH Corner

WB2VJD/CE0	via K5GOT, 106 N. Munn St, Warren, Arkansas, USA.
CR4BA	Box 90, Sao Vicente, Cape Verde Is.
EA9EJ	Justo Perez, Nuevo Pabellones 22, Villa Cisneros, Spanish Sahara.
FK8AB	via W2CTN.
KC6BO	c/o Page Communication Eng. Co, Koror, W. Caroline Is. 96940.
KG6IF	via W6ANB, Larry Miller, 344 Calle Miramar, Redondo Beach, Calif.
PY8AI	Box 109, Corumba, M.G., Brazil.
SV0WL	via W3CJK, William Corbin, 20 Frederick Av, Frederick, Md., USA.
TI9JIC	via TI2JIC, PO Box XV1, San Jose, SJ, Costa Rica.
TI9LH	via TI8LH, Leslie Heilbron G, Puntarenas, Costa Rica (or PO Box 2412, San Jose.)
VK2AVA/P **VK2EX/P**	via WA2RAU, Dr. Sam Rosen, 39 Old Orchard Road, New Rochelle, NY, USA.
VK2BRJ/9	via W4ECI.
VK9OM	Box 86, Lae, Territory of New Guinea.
VP2AP	via W2OIB, 23 Minton Court, Red Bank, NJ, USA.
VP2GSM	via W9YSM, Alfred Waack, 75 N. Highway 59, Barrington, Ill, USA.
VP8JD	via CX2AM, Americ Mantegani, PO Box 806, Montevideo, Uruguay.
VQ8AX	via VQ8AD, PO Box 467, Port Louis, Mauritius.
VQ8CB	Operation by W9WNV—via W4ECI.
VQ9AA/C	via W4ECI.
VU2WNV	via W4ECI.
YV0AA	via Radio Club Venezolano, PO Box 2285, Caracas, Venezuela.
ZD3F	via W2CTN.
1B9WNV	via W4ECI.
WA2DLJ/3V8	via WA2DIJ, Nathan Schnoll, 1485 Jefferson St, West Englewood, NJ.
7Q7LZ	A. M. Pomfret, PO Box 13, Mzuzu, Malawi, or via G3LZZ.
8RIG	via WA4UOE, 340 SW 64th Way, West Hollywood, Fla. 33023.
9X5GG	via DOTM.

QSL Managers

W2CTN	Jack Cummings, 159 Ketcham Av. Amityville, NY, USA 11701.
W4ECI	3101 Fourth Av. South, Birmingham 5, Alabama, USA 35233.
DOTM	Stu Meyer, PO Box 7388, Newark, NJ USA, 07107.

* * *

RSGB QSL Bureau: G2MI, Bromley, Kent.

for 24 hours a day from 18 March to 7 April, and will be on all bands 160-10m on a.m./c.w./s.s.b. Requests for skeds or direct QSLs should be sent to: J. A. Lush, G3TGY, Queens' College, Cambridge.

A resumé of the results of the recent Royal Signals expedition to **Kuria Muria Is.** shows that 2005 contacts were made, 75 per cent of these being on 14 Mc/s. All bands 10 to 80m were used, and 109 countries, 36 zones, and all states except KL7 were worked. Conditions generally were pretty poor, and static from the generator caused a great deal of trouble, causing a permanent reading of S7 on the "S" meter! The aerial used was an inverted Vee up about 60 ft. and fitted with traps for multi-band operation. The equipment was an HW 32A/RA1 combination on 14 Mc/s and KW2000 for the other bands. Many CQ calls were put out on wide open bands without producing replies, and Ray sometimes found it better to break into an existing contact to get a report. However, in view of the low power of the equipment and the fact that no beams were available, results were considered to be satisfactory, the most pleasing feature being S9 reports from the USA on 3·5 Mc/s. VS9ARV will be returning to the UK in March and QSLs for the VS9HRV trip should be sent *via* RSGB although US stations may send their's *via* W9ARV.

Nick, VP8IY, will be going to the **South Shetlands** shortly, He will make special efforts to contact the UK but wishes it to be known that if he is troubled by callers *during* contacts and the general behaviour so prevalent amongst DX pileups nowadays, he will QRT and there will be no more activity or QSLs from him. Please *listen*!

1A6SBO appeared on 14 Mc/s s.s.b. for two hours on 5 February. This seems to have been WA6SBO operating from an undisclosed location, possibly Rocas Alijos (116 W, 25 N). High seas were responsible for the short duration of his stay; should ARRL decide that this is a "new one" there will be further operation later. 135 QSOs were made.

VK2AVA and VK2EX expect to visit **Lord Howe Is.** between 5 May and 15 May. Their equipment will consist of Galaxy transceivers, Hy-Gain beams, and verticals, and they will be on all bands 10 to 80m. VK2AVA/P will be on s.s.b. (the only frequency so far mentioned being 14,185 kc/s) and VK2EX/P on c.w. They will make special efforts to work into Europe, and will try both the long and short paths between 06.00 and 08.00, and at 20.00. Arie says "calls on our own frequency will be discouraged."

Following his spell at Chagos, where he signed VQ9AA/C, Don Miller made a short stop on Blenheim Reef (which according to the writer's map is adjacent to the Chagos Is.). Here he used the call-sign 1B9WNV. From there he proceeded to the Laccadive Is. for a short stay as VU2WNV. At the time of writing he was back in the Seychelles, and scheduled to leave Mahé on 10 February for Mombasa where he should have arrived by the 15th. It was then planned to leave for Mauritius, possibly by air. Don has been given the call VQ8CB and possible locations to be visited include Rodriguez Is., Tromelin Is., St Brandon Is., Geyser Reef, and yet another all time "new one." No doubt some of these operations will have taken place by the time this is read.

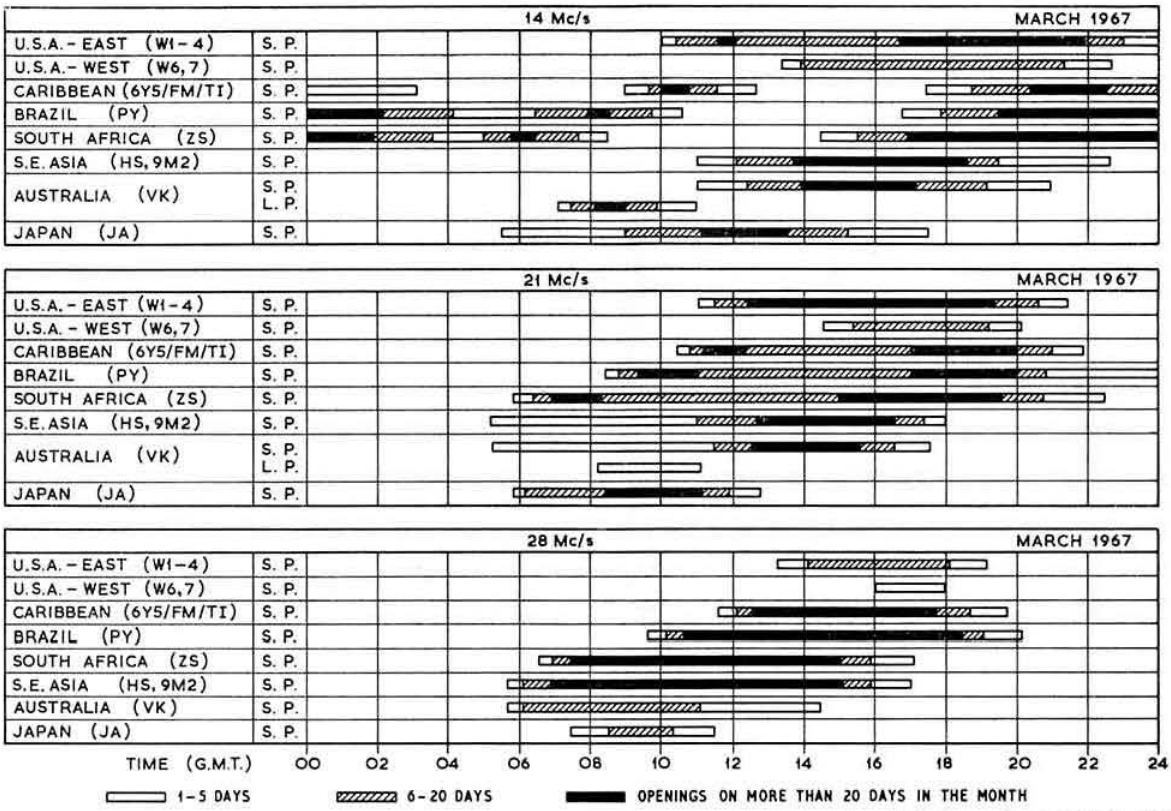
Iris and Lloyd Colvin are once again on their mammoth expedition, and should have commenced the African section by appearing from **Mauritania** with 5T5 calls around 20 February. Operating frequencies are approximately as those used by Don Miller (!), with the addition of 14,195 kc/s. All QSLs should be sent with s.a.e. plus IRCs to: Yasme Foundation, PO Box 2025, Castro Valley, Calif. 94546, USA.

Contests

The **1966 PACC Contest** results are now to hand. These show **G2LU** to be top UK entrant with 3496 points. Other participants were G3AIR (2754 points), G2WQ (891 points) and G3JFY (759 points). The **1967 PACC Contest** will take place between 12.00, 29 April and 18.00, 30 April. All bands 1·8 to 28 Mc/s plus 144 and 432 Mc/s may be used, and phone or c.w. contacts may be made, but not cross mode or cross band. On 160m, PA stations are restricted to the segment 1825-1835 kc/s, and are only permitted to use c.w. Stations outside the Netherlands, should call "CQ PA" and when in contact give report plus serial number of contact (starting from 001). PA stations will give a two letter code indicating their province in addition to these numerical exchanges. Each complete contact counts 3 points, 2 points being given for receiving the report correctly, and a third for receiving acknowledgment of the received numbers. A multiplier is derived from the total number of provinces worked on each band—a maximum possible of 88. Entries must be posted before 15 June to: Mr P. v.d. Berg, PA0VB, Contest Manager VERON, Keizerstraat 54, Gouda, Holland, and should contain a signed statement that the entrant has observed the contest rules and the Amateur Radio regulations in his own country. Logs should show Date and Time of QSO, Station worked, Province, Multiplier column (only to be filled in if QSO is a new province on that band), Number sent, Number received, Points claimed. Readers are reminded that contacts in this contest may be used as credits for the PAAC Award, provided that the stations worked have submitted logs, and also that they also send in their own log.

The results of the **1966 USSR Contest** have also been received, together with certificates for the UK winners.

Propagation Predictions



During the periods of the equinoxes (March and September) the m.u.f's are distributed approximately symmetrically about the equator. For this reason propagation conditions are nearly the same in both hemispheres. In March too, the daytime F2 m.u.f's begin to fall with the approach of the summer season in the Northern hemisphere. As solar activity is on the increase, this fall should be compensated, so that propagation conditions, especially on 28 Mc/s, should not be any worse than in the previous month. On 28 Mc/s Eastern North America should still not be workable with certainty, though Central and South America, Africa and South East Asia should be heard. On 21 Mc/s all continents should be workable. The shorter nights will keep this band, and especially 14 Mc/s, open longer in the evenings. Traffic to Africa and South America on 14 Mc/s should improve in the latter half of the month compared with February, although probably not until the end of April will this band be good for night-time DX. At the present time of the equinox there will be hardly any possibility of working DX via the long path on 14 Mc/s. An exception will be for traffic via the long path to Australia. This route is frequently more favourable than the direct path. Traffic with Hawaii and Alaska should be possible under favourable conditions on 14 Mc/s from about 07.00 to 09.30 GMT and from 17.00 to 19.00 GMT. As the great circle through these areas passes through the auroral zone, contacts are rather frequently interrupted by disturbances. 7 Mc/s will continue to offer DX possibilities in March, whenever the greater part of the transmission path lies in darkness. The East Coast of North America will therefore come through at about 22.00 GMT (i.e. about the time when 14 Mc/s closes on this route) and continue to do so until shortly after sunrise. The most favourable period will be approximately between 24.00 and 05.00 GMT. From 03.30 to about 06.00 GMT Western North America should be workable on 7 Mc/s, and when conditions are favourable Alaska and Hawaii from 04.30 to about 06.00 GMT. On 3·5 Mc/s the East Coast of the USA will be heard from 24.00 to around 05.00 GMT. In the latter half of the night the dead zone will repeatedly interrupt local traffic on this band. At the present time this will mainly affect DX traffic to North America.

The provisional sunspot number for January 1967 was 108·5 with the peaks of activity lying between the 3rd/10th and 21st/31st of the month. The predicted smoothed sunspot numbers for May, June and July are 84, 88 and 92 respectively.

G3EYN was top single operator station with 5841 points, followed by G3PJW (5760), G2GM (2400), G2AJB (1574), G3IAR (964) and G3URX (24). G3JUL was the only multi-operator entry. This year's event will be held between 21.00, 6 May and 21.00, 7 May, and participants must show 12 hours of continuous operating time for scoring out of the possible 24, although the whole of the log should be submitted. Contestants exchange reports plus serial number of QSO, Russian stations send report plus their Oblast number. All bands 3·5 to 28 Mc/s (c.w. only) will be used. Contacts between stations in the same continent count 1 point, in different continents 3 points. Total score is the number of QSO points scored during the chosen 12 hour period multiplied by the number of different countries worked (the " R-150-S " countries list is used). SWL's may enter; they score 1 point for hearing one end of the QSO, and 3 for hearing both ends. Logs should be mailed by 1 June to: Box 88, Moscow, USSR. Contacts in this contest may be used for claiming the " R-150-S," " W-100-U," " R-100-0," " R-15-R," " R-10-R " and " R-6-K " awards (see pp. 591/592, September, 1966 BULLETIN).

The **1967 CQ Magazine WW S.S.B. DX Contest** will take

WOBURN ABBEY 10.30 ..... O'STANBRIDGE 12.30

GB2GG

1 APRIL, 1967

To mark the centenary of modern communications from this Harrier to radio a charity coach run will take place on 1 April, 1967.

The journey from Woburn Abbey to a Charity Luncheon at the Five Bells public House, O'Stanbridge is expected to take two hours commencing at 10.30 GMT. A return trip to the Abbey will be made in the afternoon.

Two mobile stations will be operating from the coach, one on 70·48 Mc/s a.m. and the other on 14·275 Mc/s, 21·4 Mc/s or 28·6 Mc/s s.s.b. depending on DX propagation at the time.

A charity luncheon has been arranged to commence at 12.30 GMT at the Five Bells, tickets for which are priced 25s. There are also a limited number of seats—price 21s.—available on the Harrier. Passengers will be required to wear Mid-19th century costume.

Applications for Luncheon tickets, or a coach seat must be sent to Mr R. Barton, G3PQH, 25 Hillside Road, Marlow, Bucks., before 23 March, 1967

ORGANISED BY THE EALING AND DISTRICT RADIO SOCIETY IN AID OF THE RADIO AMATEUR INVALID AND BEDFAST CLUB

place between 00.00, 8 April and 24.00, 9 April. This is an overall increase of 12 hours, but the compulsory rest period is now extended to 18 hours which may be taken in not more than three periods during the 48 hours. Multi-operator stations need not have a rest period. All bands 3·5 to 28 Mc/s may be used, and single or multiband entries are permissible. QSOs between stations in different continents count 3 points, in the same continent 1 point, in the same country no points (but may be used for obtaining prefix multipliers). The multiplier is the number of prefixes worked, irrespective of band. Logs should be sent to: *CQ*, 14 Vanderventer Avenue, Port Washington, LI, NY, 11050, USA, postmarked no later than 30 April. Summary sheets and a *small* number of log sheets are available from G3FKM.

Band Reports

Conditions appear to have been fairly good during the period under review. The weekend of the contest on 160m seems to have been poor during the first part and very good during the second. Since then, quite a lot of DX signals have been heard. Eighty has also been producing good DX signals, although much deliberate QRM appears to be being caused to those trying to work it by those who have not read the terms of their licences or who do not own a dummy load. The most disappointing band has been 40m where the commercial interference seems to be becoming worse, and quite a few regular occupants seem to have given up the unequal struggle. Twenty metres has not yet started to open to the Pacific in the early mornings, but should be doing so quite soon, and it has been staying open until past midnight some days. Fifteen likewise has been quite good, a "CQ" call in the mornings often bringing back a number of JAs, and after mid-day the W's have been heard in force. Ten metres has been open consistently to the USA and all call areas have been worked. A report of G3RAF's signals being heard in New Zealand at 18.20 has been received.

Very many thanks to the following, whose reports enabled this part of *MOTA* to be compiled: G2BOZ, G2LB, GW3AX, G3HCT, G3HDA, GM3IAA, G3IGW, G3JVJ, G3KSH, G3SED, G3SML, GM3SVK, G3SYC, G3URX, G3VJG, G3VMQ, G4JZ, G4MJ, G8JM, G8VG, 9J2BC, BRS20317, BRS27806, BRS28198, A3942, A4038, A4568, A5082, A5105, A5182 and A5333.

1·8 Mc/s C.W.: HI8XAL (04.30-05.30), W1FZJ/KP4 (05.30), OH7NS (20.55), ZB2A (02.30), ZD8J (22.45, 00.00, 03.02).

3·5 Mc/s C.W.: FC7IJ (? Corsica, 23.22), OH0AB (23.05), OX3LP (22.30), TA3FA (01.15), UM8FG (19.40), UW0AF (21.26), VK5KO (20.20), ZB2AM (22.50), ZC4DW (22.57), ZD8J (02.25), ZL4IE (07.45), 5A1TY (20.30), 7X0AH (00.10), 7Z3AB (00.42).

3·5 Mc/s S.S.B.: EA9AZ (21.00), EP2ML (23.30), HI8XAL (07.44), KP4CZ (00.30), MP4MAW (00.24), MP4TBO (20.30), OY7ML (23.30), 3C3FZJ/SU (00.16), TI2NA (06.20), UA9BE (22.10), VP5AB (22.30), VP9FB (22.00), VS9HRV (21.17), VS9s AHV, AJC, ALV (21.00), ZC4AK (00.42), 4X4AS (00.24), 9V1LP (23.23), 9X5WM (22.30).

7 Mc/s C.W.: CO3CS (07.17), CR6AI (21.20), DU1VM

(14.45), FG7XF (23.25), JAs (14.30-15.45), KL7s OJ, PI
14 Mc/s S.S.B.: FK8AB (07.40), FO8s AA, BQ (16.00), FY7YD (10.18), HS4AK (13.15), 16KDB (Special prefix, 17.30), KC6BO (08.03), KG6IJ (10.40), KG6SB (10.50), KL7FIL (10.30), PY7YF (Fernando de Noronha, 18.03), TI9JIC (11.59, 20.55), TJ8AC (16.45), VK9BW (08.10), VK9DJ (12.03), VK9OM (08.10), VK9XI (14.44), VK0CR (08.15, 15.45), VP1PE (09.21), VP2KM (21.54), VP2SAA (18.00), VQ9AA/C (16.05), VU2WNV (16.30), ZD3G (18.33), ZD8CX (20.06), ZD9BE (19.20), 1B9WNV (13.00 to 18.00), 9M6JP (15.00), 9Q5CM (19.48).
21 Mc/s C.W.: FG7XJ (12.20), KZ5FX (17.14), PJ2MI (12.07), VK2APK (12.40), VQ9AA (10.50), VS9MB (07.50), YK1AV (13.23), 6Y5JB (12.30), 9L1TL (16.20).
21 Mc/s A.M.: FR7ZG (16.45), VK6DR (12.10).
21 Mc/s S.S.B.: WB2VJD/CE0 (14.30), CR4BA (12.00), HP1PD (12.02), HR2ML (18.12), HS3NT (10.05), JAs (LP. 08.30 to 09.30), KR6LL (09.25), MP4BGF (11.53), TI5YOR (18.23), TU2AY (11.37), VP2GSM (18.30), VS6s BE, EK (09.50), VS9ALV (15.50), YV0AA (14.00), ZD5R (10.13), ZL1IL (LP. 08.55).
28 Mc/s C.W.: KV4CI (11.37), TA2AC (09.00), UA9KOH (11.00), UL7AIN (09.30), UM8AP (10.54), VK3AKN (09.59), VQ9AA (10.50), VU2TZ (09.30), 6W8DD (10.08), 7Q7RM (10.15), 9L1TL (13.15).
28 Mc/s A.M.: CR4BC (12.15), CT2AC (14.17), VQ8BJ (14.09), XE2DDZ (15.00).
28 Mc/s S.S.B.: FH8CD (11.20), KR6RN (09.14), MP4BBW (14.18), TI2REL (17.17), TI2JCC/W1 (16.00), XE1PY (17.22), ZLs 2LH, 4LZ (08.35), 5R8AS (15.04), 8R1G (11.05), 9J2VX (09.00), 9M2PO (11.50).
(08.20), VK5KO (00.15), VP8JG (00.08), VQ9AR (23.27), W6ULS (15.00), K7VHL (Ariz. 08.40), YV6EE (00.18), 3C8BB (09.05).
7 Mc/s S.S.B.: CN8s AW, BB, BV (20.20), KS4CC (08.50), KZ5TL (08.12), PYs 1-8 (22.00), PY7AYJ (20.59), VQ9AR (23.12), YS1EME (07.39), ZD8CX (19.20), ZD8RB (22.48).
14 Mc/s C.W.: CO2DR (16.00), CR4AE (14.00), CT3AS (20.04), FB8XX (10.19), FK8s AB, BJ (07.40), FO8AA (14.50), FR7ZN (16.15), HV3SJ (09.30), VR4CR (09.00), VS9MB (16.55), ZS3XG (16.35), 9V1MT (15.29), 9X5SA (21.50).
14 Mc/s A.M.: VP8JD (S. Orkney, 20.50).

1967 Countries Table

	Mc/s						
	1·8	3·5	7	14	21	28	Total
G3IAR	10	45	28	54	33	8	178
G3JVJ	14	10	2	1	2	4	33
GM3SVK	10	6	20	50	41	5	132
G8VG	1	15	15	30	18	19	98
G3ING	3	11	6	4	6	1	31
G3LNS	1	9	—	16	9	8	43
G3KSH	—	5	5	5	1	9	25
G3VJG	—	2	2	1	8	17	30
G8JM	1	—	12	59	16	1	89
9V1LK	—	1	17	48	18	6	90
9J2BC	—	—	—	17	2	18	37
A3942	12	40	33	63	21	4	173
A5273	4	34	16	45	28	18	145
A4568	3	33	26	104	68	28	262
BRS26198	1	33	13	47	13	7	114
A5105	1	23	7	66	23	12	132
BRS27806	2	11	10	54	40	28	145

This month's table is given in order of 1·8 plus 3·5 Mc/s totals.

DX Briefs

EA9EJ in **Rio do Oro** is being supplied with a beam aerial by W4QCW, and a number of other US amateurs are trying to arrange for him to be sent some s.s.b. equipment. At present he has an old receiver which is not able to resolve s.s.b. too well, and is transmitting on a.m. only. Justo seems to be heard on 21 Mc/s around 18.00, mostly on 21,200 kc/s.

VK2AIF/XV5 has been on the air from **Vietnam.** He asks for QSLs *via* the VK2 bureau. As XV is on the US " banned " list (its government objects to communication taking place between its amateurs and those of other countries) contacts do not count for DXCC. The only station in Vietnam with express authority to contact other countries is K1YPE/XV5; these QSOs do count for DXCC. The only other countries on the " banned " list for W stations are Cambodia, Indonesia, and Thailand. Canadian amateurs are not permitted to talk to stations in Laos and Jordan in addition to the places already mentioned.

Stockholm stations are being permitted to revert to their old SM5 prefix if they so desire. All new licensees in the area will receive SM0 calls.

ZL1AI is reported to be on the air from the **Kermadec Is.,** so far he has been on a.m. only, but is apparently able to read s.s.b. QSLs should be sent to his home QTH. He was on during the ARRL DX Contest, just below 14,200 kc/s.

VK0RS is said to have been contacted on 14 Mc/s s.s.b. at about 11.30. He told I1RB that he was on **Heard Is.** and asked for QSLs *via* VK6RU.

ZK1AR, **Cook Is.** is on 14 Mc/s s.s.b. almost daily between 06.30 and 10.00. He also operates on c.w. in the upper part of the c.w. band. He will be leaving for Samoa in late March.

W2GHK is attempting to obtain 9U5ID's logs so that he can deal with the backlog of applicants for QSLs, and has now also become QSL manager for 9X5GG.

FR7ZL is now active from **Tromelin Is.** and has been heard at good signal strength on 14,140 kc/s at 18.00—complete with attendant horde of deaf callers.

* * *

Many thanks to all correspondents and thanks and acknowledgments to the following: *DX'press* (PA0FX), *The L.I.D.X.A. Bulletin* (WA2EFN), *The DX'er* (W6PHF), *DX News Sheet* (Geoff Watts), *The DX'er's Magazine* (W4BPD), *The West Gulf DX Bulletin* (W5IGJ), *Florida DX Report* (W4MVB), *CQ DX* (ARI), the *Ex-G Radio Club Bulletin* (W3HQO), *KARL News* (HM1AJ) and *QSO* (Saskatchewan Amateur Radio League). Please send all items for **April** issue to arrive by **15 March,** for **May** issue by **12 April** and for **June** issue by **17 May.** CU in BERU!

GB2RS SCHEDULE

RSGB News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.15 a.m.	Belfast
	10.30 a.m.	North Midlands
	11 a.m.	North West England
	11.30 a.m.	South West Scotland
	12 noon	North East Scotland
145·10 Mc/s	9.30 a.m.	Beaming north from London
	10.00 a.m.	Beaming west from London
145·8 Mc/s	10.15 a.m.	Beaming south from Belfast
145·30 Mc/s	10.30 a.m.	Beaming north west from Sutton Coldfield
	11.00 a.m.	Beaming south west from Sutton Coldfield
145·50 Mc/s	11.30 a.m.	Beaming north from Leeds
	12 noon	Beaming east from Leeds

News items for inclusion in the bulletins should reach Headquarters not later than first post on the Thursday preceding transmission. Reports from affiliated societies and from non-affiliated societies in process of formation will be welcome.

Mains Conversion of the W1191-A Frequency Meter

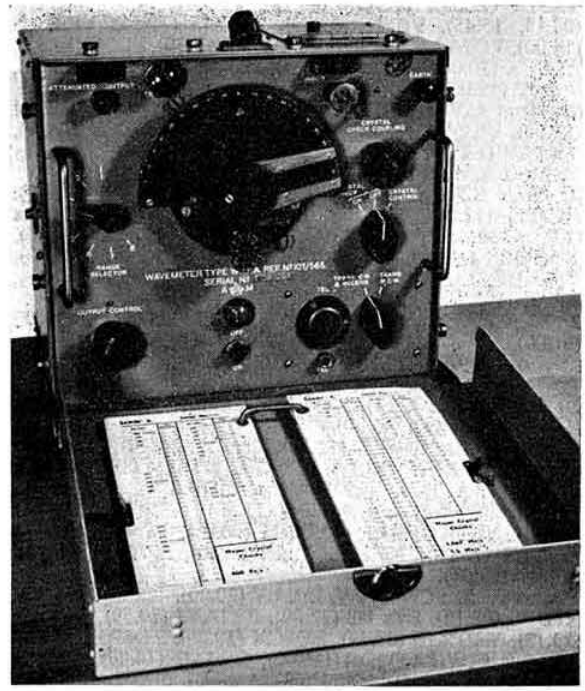
By R. G. CHRISTIAN, M.Eng., M.I.E.E., A.M.I.E.R.E., G3GKS*

THE W1191A is a crystal-checked heterodyne frequency meter with a coverage of 100 kc/s to 20 Mc/s in eight switched ranges and appears to be the Air Ministry equivalent of the well-known American BC221. The instrument is designed to operate with internal battery supplies of 60V and 2V which makes it inconvenient in use. This article describes the conversion of the frequency meter to mains operation involving the minimum amount of modification, virtually no new wiring being required. This is achieved by using octal-based valves with 6·3V heaters and moulded-type octal valveholders. Whilst it would have been possible to produce a sophisticated conversion more in keeping with modern trends by using miniature valves or even transistors, this would have defeated the author's objective which was to carry out the conversion with the minimum amount of effort on his part!

Description of Existing Instrument

Fig. 2 shows the circuit diagram of the instrument in its unmodified form, the four valves used being directly heated types with 2V filaments. V1 is a VR82/X24 triode-heptode in which the triode functions as the variable-frequency oscillator covering frequencies from 100 kc/s to 20 Mc/s on fundamentals, the eight ranges being switched by S1-S2. Tuning is carried out by the variable capacitor C9 and calibration at the crystal check frequencies by a parallel variable capacitor C10. The v.f.o. output is available via T4 to either an attenuated output via R1 or the input terminal connected to the heptode signal grid. The v.f.o. signal is also connected internally to the heptode mixer so that an incoming signal, whose frequency is to be measured, can be applied to the heptode grid and mixed with that of the v.f.o., the heterodyne product appearing at the heptode anode.

* 17 Orton Road, Liverpool 16.



The W1191-A frequency meter with its calibration charts. No external changes are necessary.

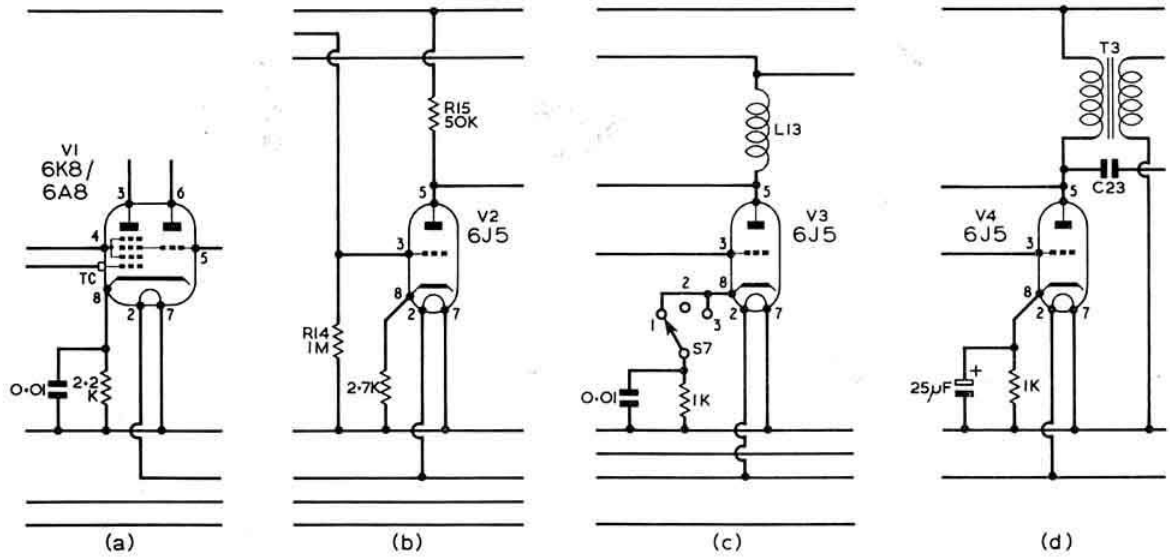


Fig. 1. The modifications to the W1191-A circuit which are necessary when exchanging the existing valves with indirectly heated types. Detailed instructions are included in the text.

This product is applied via C7 to amplifier V2 (V2 being a VT50/HL2K triode), where it is amplified. The output from V2 is fed to a transformer T2 via C19 and appears at the grid of V4 which is also a VT50/HL2K triode operating as an output amplifier or as a modulator depending on the setting of the ganged switches S9-11. With the switches in position 2, V4 acts as an audio amplifier with a choice of either high impedance output via C23 or low impedance output via T3. Since no external facility is available for selecting these outputs the desired connection must be made internally. If high impedance output is to be used it would be desirable to replace the original blocking capacitor (C23) by a new one.

V3 is a VR19/PM2 triode which acts as a crystal check oscillator or as a crystal-controlled signal oscillator. Switches S3-8 are ganged and in position 1 cause the crystal oscillator to operate with its internal 1 Mc/s crystal, the output being fed to the mixer grid for calibrating the v.f.o. In position 2 the oscillator is inoperative and in position 3 operates with an external crystal, the v.f.o. then being inoperative. The modulator, V4, will modulate either the v.f.o. or the crystal oscillator (external crystal). There is thus a total of five operating conditions (a sixth is not valid) for the combinations of the two banks of switches.

Modifications to Mains Operation

Indirectly-heated mains valves with 6·3V heaters and octal bases were used since the existing valves had moulded bases of the same physical dimensions; thus no drilling was required. Furthermore virtually all the existing wiring to the valveholders can remain unaltered.

The frequency meter is constructed in two basic units, the mixer-v.f.o. being contained in a completely screened box and the other stages on one chassis. This chassis should be removed from the panel before commencing the modification, the leads to the mixer-v.f.o. box being disconnected. The cover plates of the v.f.o. box should be removed but it is not necessary to remove this unit from the panel. The two wooden battery compartments in the main cabinet should be removed and discarded to make room for the mains power supply unit.

The three triodes may be replaced by 6J5 type triodes and the triode-heptode by either a 6K8 or 6A8 triode-hexode (the G and GT/G types are included). To avoid a mass of unidentifiable leads the conversion should be carried out one stage at a time. The leads to V2 should be disconnected from the valveholder and the holder replaced by a moulded octal type which will be found to fit exactly without the need for drilling. The grid resistor R14 and anode resistor R15 may be retained and connected to the appropriate pins of the octal holder, i.e., pins 3 and 5 respectively. The end of R14 previously connected to the l.t. positive lead should be earthed, together with one of the heater pins (2 or 7), the other heater pin being connected to the + l.t. lead which now forms the main heater connection. The only additional components needed are a resistor of 2700 ohms from cathode (pin 8) to earth which may be bypassed if necessary by a 25 μF 6V electrolytic capacitor. The completed conversion of this stage is shown in Fig. 1(b).

The same procedure may be adopted for V3, the only alteration being in the heater and cathode connections. The switch S7 should be placed in the cathode lead in series with a 1000 ohms resistor between cathode and earth, the resistor being bypassed by a 0·01 μF capacitor. The earthed filament lead is used as one heater connection, the other heater pin being connected to the + l.t. lead, as shown in Fig. 1(c). The only alterations to V4 are again those of heater and cathode as shown in Fig. 1(d) the cathode being connected to chassis via a 1000 ohm resistor shunted by a 25 μF, 6V capacitor. It is necessary to short-out the original bias components, R21 and C22, which may be removed and re-used if required.

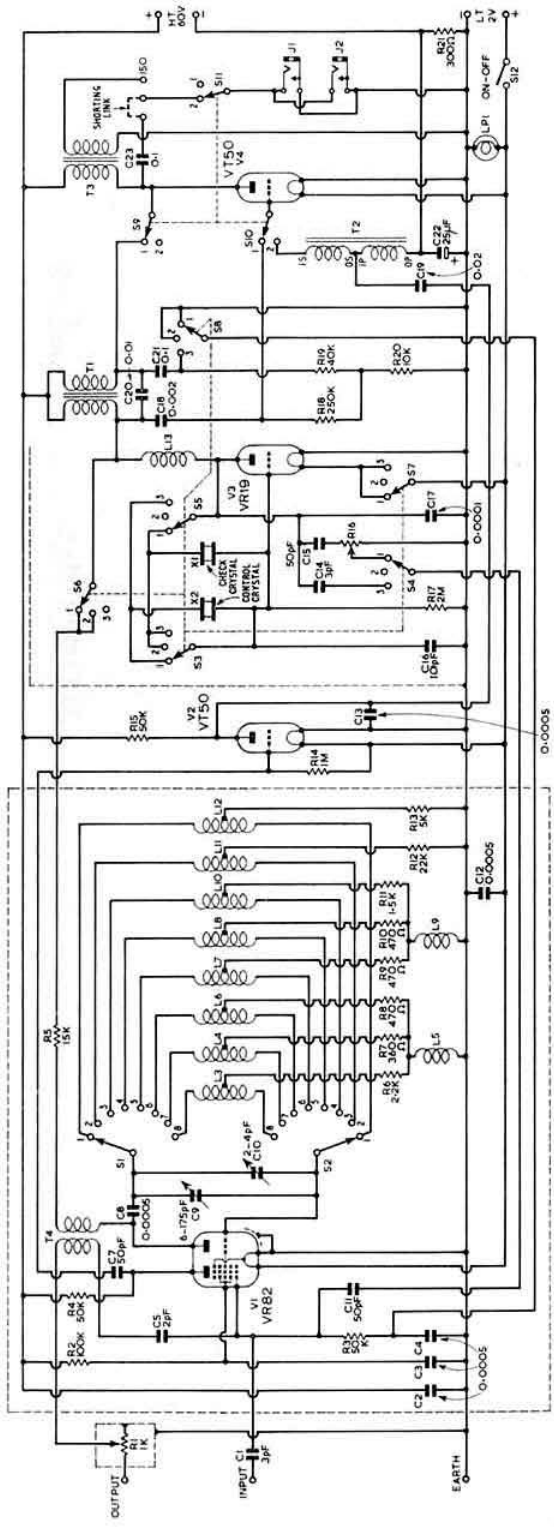
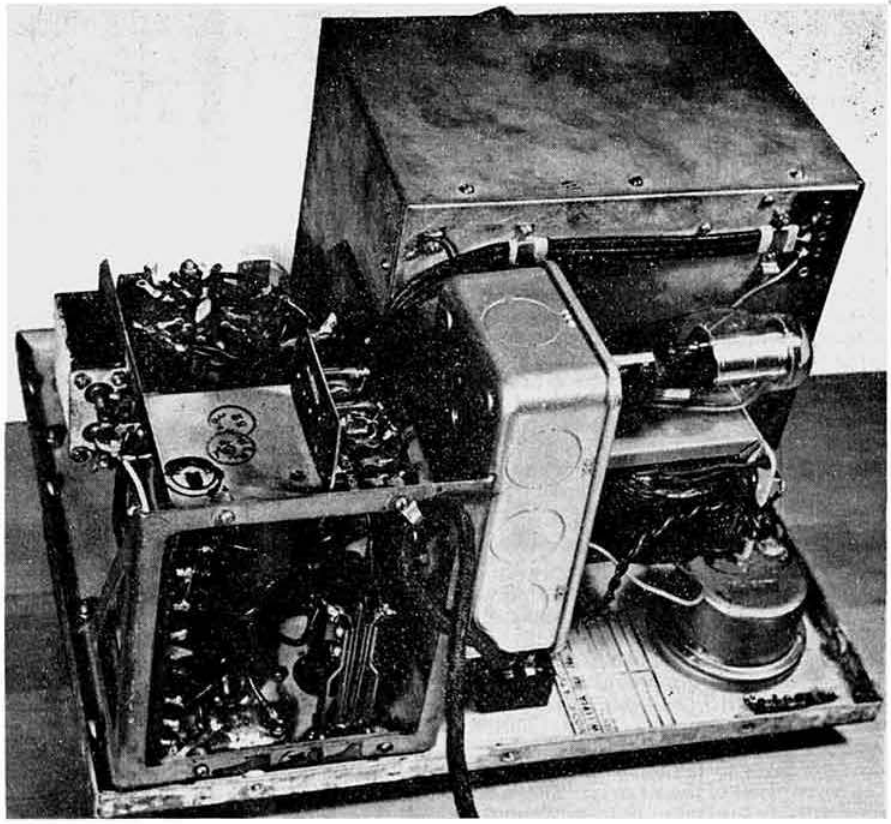


Fig. 2. The W1191-A before modifications are carried out.

Finally the mixer-v.f.o. stage may be modified in the same way by connecting a 2200 ohms resistor shunted by a 0·01 μF capacitor between cathode and chassis as shown in Fig. 1(a). The heater modifications follow the previous pattern. Since the VR82 has larger inter-electrode capacitances than either the 6K8 or 6A8 it is necessary to add capacitance to the small variable capacitor C10. This is conveniently done by connecting a small pre-set trimmer (e.g., Philips 3-30 pF) across C10 and adjusting it as described later. An alternative is to experiment with fixed capacitance values of the order of 10 to 15 pF. The coupling capacitor C7, mounted alongside C1 outside the v.f.o. box, may be increased to about 200 pF to obtain an increase in sensitivity. Any large increase in C7 (to say, about 0·01 μF) will cause motor-boating of the amplifiers which may only be reduced by appropriate decoupling.

The pilot lamp bulb, LP1, should be replaced by a 6·3V version and the on-off switch S12 disconnected. The conversion is now complete except for the provision of a power unit which is required to supply 150V stabilized at about 15 mA d.c. and 6·3V at about 1·5A a.c. A suitable power pack was constructed on an MK switch case and is shown in circuit form in Fig. 3, the front panel switch S12 being used as the mains on-off switch. The case is bolted to the frequency meter as shown in the photograph of the interior. The mains transformer used was an Elstone MT/MR. An OA2 or equivalent would be electrically similar to the VR150/30 stabilizer quoted except that it is slightly more expensive on the surplus market. The rectifier used was an OA211 but any silicon diode with a peak inverse voltage of about 800V will suffice.



The frequency meter with its new mains power supply below the v.f.o. housing.

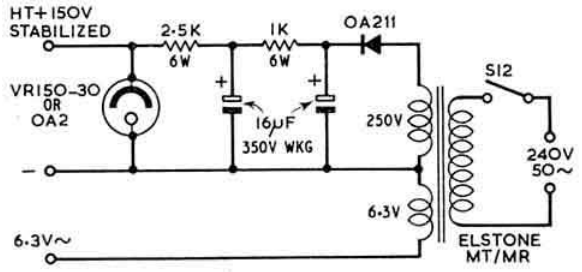


Fig. 3. The 150 volt stabilized power supply, which can be built, without difficulty, on a standard MK electrical switch case.

Calibration and Conclusions

For normal use the operating instructions contained in the lid of the instrument should be followed. However, in view of the change of V1 it is necessary to correct the effective value of C10 by means of the additional trimmer or fixed capacitor already mentioned. This is done by setting C10 to its mid-value capacitance and then following the calibration procedure using the added trimmer to produce zero beat at the lowest crystal check frequency. The remaining crystal check frequencies should then be tried, using C10 only, the additional trimmer being left at its initial setting. If C10 will give zero beat on each check frequency then all is well. If not, the added trimmer must be readjusted and the procedure repeated until C10 will give zero beat on all check frequencies. It should now be apparent why it was decided to use a variable trimmer across C10 in preference to a fixed capacitor. Before re-checking the v.f.o. calibration the 1 Mc/s oscillator can be checked against MSF and if necessary trimmed for zero beat.

If a standard frequency source is available it might be advantageous to recalibrate the instrument over its entire spectrum and to discard the existing calibration charts. However since there are a large number of crystal check frequencies throughout the range of the instrument it is unlikely that the frequency error introduced by changing V1 will be large enough to cause concern. If the reader is in doubt he can easily check the calibration at suitable points by using the Standard Frequency Transmissions (for details see the RSGB *Radio Data Reference Book*).

The instrument shown in the photographs and modified as described has been in use by the writer for some years now and has given reliable service with adequate accuracy.

An Improved Method for Etching Printed Circuits

By KEITH TAYLOR, G3NNW*

THE transistor, which is steadily making an inroad into the regions which were once dominated by the valve, brings with itself many fringe benefits, one of which is the simplification of chassis work. Light, easy to work synthetic laminated board can be used instead of the relatively clumsy aluminium.

There are many ways of utilizing laminated board for fabricating circuits, but for compactness the most satisfactory is the printed circuit board. In this method a sheet of copper is bonded on to a sheet of laminated board. To fabricate the circuit, copper is chemically etched away to leave the required circuit traced out in copper. Holes are drilled in the copper circuit where they are required for fixing components.

The actual layout of the printed circuit is fairly straightforward—in many cases the actual circuit diagram can be transferred to the printed circuit board. The etching of the board, however is not quite so simple. In the publications intended for the amateur radio enthusiast, the writer can recall only one article dealing with this matter in detail [1]. The method to be described here is superior in many ways to that given in the reference, being quicker, cheaper, safer, and less liable to go wrong. It is also considerably cheaper than purchasing printed circuit kits.

Producing Printed Circuits

Briefly, the procedure is to paint the circuit on the copper side of the laminated board, using cellulose paint. The unwanted copper is then etched away in a solution o ammonium persulphate and sodium chloride, and the cellulose paint can then be removed with acetone.

The cellulose paint is best applied with a fine camel hair paint brush, or with a *Uno* stencil pen, size 2 being the best for most purposes. The cellulose paint should be thinned to a consistency suitable for painting, using acetone as the thinning agent. The etching solution is prepared by dissolving four teaspoonfuls of ammonium persulphate and one quarter of a teaspoonful of sodium chloride in every three and a half fluid ounces of water used. " Kitchen " units are given in preference to standard units, being easier to measure at home. None of the quantities are critical, but the exact quantities are given in [3], for those who wish to follow these precisely. Three and a half fluid ounces of this solution are sufficient to etch one square foot of copper 0·0032 in. thick, which is the most usual thickness encountered.

Sufficient solution to cover the board must be made, which can be placed in a soup plate, or small developing dish. The reaction proceeds best when the solution is at a temperature of 37°C (98·6°F), which is approximately body heat. No advantage will be gained from heating the solution to a higher temperature, in fact if it is heated to above 50°C (122°F), the ammonium persulphate will decompose, and the solution will be useless.

The solution must be constantly agitated as etching proceeds, and under the conditions specified, etching should take from three to 10 minutes. When the etching time exceeds 20 minutes the solution should be regarded as spent, but it may be reactivated by adding a further quarter of a teaspoonful of sodium chloride for every three and a half fluid ounces of water used. This reactivation process can be repeated successfully three times, with a corresponding slight increase in the etching time after each successive reactivation. After three reactivations, and when the etching time again exceeds 20 minutes, the solution should be discarded, for although it will still etch copper, the board will have to remain in solution for such a time that there is danger of the solution undercutting the paint, and attacking the protected areas of copper. It cannot be stressed too heavily that the quoted etching times will be realized only if the solution is constantly agitated as etching proceeds. If not agitated, the etching can take up to half an hour, with consequent danger of undercutting.

When etching is complete, the board should be washed in water and dried. The cellulose paint can then be removed, by wiping the board with a rag soaked in acetone. The brush and pen used for painting can also be cleaned with acetone, but note that acetone can dissolve the plastic holder supplied with the *Uno* pen. Finally, the copper should be cleaned with *Duraglit* or some similar preparation, and the component holes drilled, using a number 63 drill.

It is not advisable to prepare large quantities of the solution at one time, for it will decompose in two to three days, even if kept in a stoppered bottle.

Precautions

A word now about safety. None of the chemicals used are dangerous, in the accepted sense of the word. In the writer's experience the solution does not harm the skin, nor does it stain clothing. The spent solution may be poured down the sink, but it is worth noting that the solution will etch brass and stainless steel at the same rate at which it etches copper.

Availability of materials

" Uno " pens are available from artists' supply shops, and most stationers. Cellulose paint can be bought in very small tins from car accessory shops and acetone is available in bottles costing about a shilling from any dispensing chemist. Sodium chloride is none other than common salt. Ammonium persulphate can be obtained to order from most dispensing chemists, but alternative sources of supply are given in [2].

References

[1] " Printed Circuits for Amateur Equipment," by C. E. Deamer, Grad. I.E.R.E., G3NDC, *Short Wave Magazine*, April, 1965.

[2] The following firms will retail Ammonium Persulphate: Griffin & George Ltd, branches in London, Bristol, Birmingham, Manchester, Newcastle upon Tyne and Glasgow, and Orme Scientific Ltd., PO Box 3, Stakehill Industrial Estate, Middleton, Manchester, Lancs. The price is around 5s. 6d. for 500 grammes, plus postage and packing.

[3] Exact amounts of chemicals required for etching solution: 25·2 grammes of ammonium persulphate and 0·6 gramme of sodium chloride for every 100 millilitres of water.

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TECHNICAL TOPICS

By PAT HAWKER, G3VA

FRESH FIELDS TO CONQUER?—SIMPLE SYNCHRODYNES TWO SPEECH COMPRESSION CIRCUITS—THE FIELD EFFECT VALVE—V.F.O. TOPICS—AN IGFET V.F.O.—P-I-N DIODES IGNITION SUPPRESSION—A 6FT. H.F. AERIAL?

SOMETIMES, inevitably, one wonders exactly what should be the aim of technical development by amateurs, today. In the very early days, amateurs—even well after their great breakthrough in the 'twenties in opening up the short-waves—could fairly claim to be well up in the forefront of the state-of-the-art in h.f. and v.h.f. communications, and indeed well ahead of many users, including the military. More recently, this has remained true in a number of specific areas, though perhaps not over the whole field. Since the war, amateurs have helped pioneer the development of stable v.f.o.s (though now overtaken by the more complex frequency synthesizers), high-frequency s.s.b. with full carrier suppression, rotating beam aerials of compact dimensions (taken up commercially in the form of rotating log periodics), and low-noise v.h.f. receivers for over-the-horizon reception, etc. And even now, in this era of large scale research and development in communications techniques (often carried out by persons having an amateur background), the amateur has been among the first to use transistor transmitters, and there are the *OSCAR* space projects and many other scientific and engineering developments.

But it must be admitted that there is a growing danger of the amateur opting out of many fields in which progress is still possible. There are often good reasons for this—many of the new ideas are tending to be of almost incredible complexity and cost, and require specialized design techniques with stiff doses of mathematics, or rely on semiconductor devices still costing many pounds apiece. But we should not forget that in the past amateurs have frequently proved their ability to tackle some new and apparently complicated technique and then simplify it to the stage where costs become more reasonable.

At present, among all the information published in the Amateur Radio journals, here and overseas, most of the emphasis is placed on improving existing techniques, and only very occasionally does someome attempt to draw attention to systems outside those in common use. To quote one example. To many amateurs, the ultimate in communications efficiency is summed up by narrow-band s.s.b.; yet almost unnoticed the trend in many of the research laboratories seems to be veering off in totally different directions (in part due to a classic article in *Proc IRE* by J. P. Costas, W2CRR). Whole new families of broad-band and/or digital communication techniques are arising under such names as " random access discrete address," " spread spectrum," " adaptive systems," " coherent-noise or pseudo-noise " often with frequency and phase coded waveforms and depending on the concept of signal processing and signal matching. Many of the coded systems stem from modern understanding of Shannon's communication theory. Digital systems, including those based on pulse code modulation, have theoretical advantages over non-coded systems. Some engineers now believe that eventually almost all communication will depend upon digital signals (the final victory for the c.w. enthusiast?). The transmission of speech by p.c.m. is in fact a form of high-speed telegraphy and comes close to the ideal system postulated by communication theory, despite the broad bandwidth required.

Radar now has its pulse compression and its electronically steered " rotating " beam aerials; and there is the important new concept of " active aerials "—a technique which under the name of " antennafiers " has already been shown to have direct application to simple v.h.f. two-way radio units. Then again, the principle of phase-locking, though complex, offers the possibility of recovering signals apparently embedded deep in noise, since bandwidths only a few cycles wide can be achieved.

Admittedly, many of these systems do not appear to be immediately suitable for Amateur Radio (and some would fall well outside the current terms of licences). But some must surely yield new ideas for amateur operation. It is worth noting, for instance, that with the coming of PAL colour television the cost of ultrasonic delay lines may fall dramatically, and this might well open the way to relatively cheap new forms of signal processing, not unlike those used in Kahn's Echoplex which has been advertised for amateur use in the United States for several years.

Nobody expects to see computer-controlled amateur stations yet awhile, and it is far from our intention to try to blind anyone with science (having indeed only a third hand knowledge of many of these techniques). But what we are trying to put over is that it seems most important that as amateurs we should not allow ourselves to become too inward-looking, satisfied just with improving current techniques. Perhaps more should be done to stimulate group interest in off-beat projects in the hope that something really new might result. One recalls that it was largely the efforts of a small team at W6YX (Stanford University) in conjunction with W0TQK which led to the famous s.s.b. issue of *QST* (January, 1948) destined to have so deep an influence on amateur equipment.

My thanks are to several members who over the years have drawn my attention to what has been called " this new generation of radar and communications systems." For we should think not only in terms of how new devices and circuits can be used in existing systems, but also—from time to time—how they might open the way to entirely new vistas in amateur communication, so that we are not outpaced by these fast-growing infants of the communications world.

A Future for the Synchrodyne?

One way of developing something new is to look back at ideas which have been around for a long time but which have never been widely used. Often basic principles are developed many years in advance of the materials and devices which make them practicable or economical. Poulsen's magnetic recording of 1899 had to wait until the 1940s brought forth the practical domestic tape recorder; Blumlein's stereo disc record techniques of 1929-31 were not used until the past decade; Robinson's " stenode " tone correction with crystal filter was largely forgotten until G6XN revived the idea in 1962.

In a recent *Electronics Weekly*, we drew upon these histories to question whether it is not time to look again at the synchrodyne or homodyne form of receiver. The synchrodyne can be regarded either as a superhet with an i.f. of 0 kc/s, or as a straight receiver with a balanced linear heterodyne detector. The true synchrodyne is in fact the simplest form of phase-locked receiver, and in essence consists simply of a balanced mixer (product detector), a local oscillator locked to the incoming carrier, and an audio amplifier: no

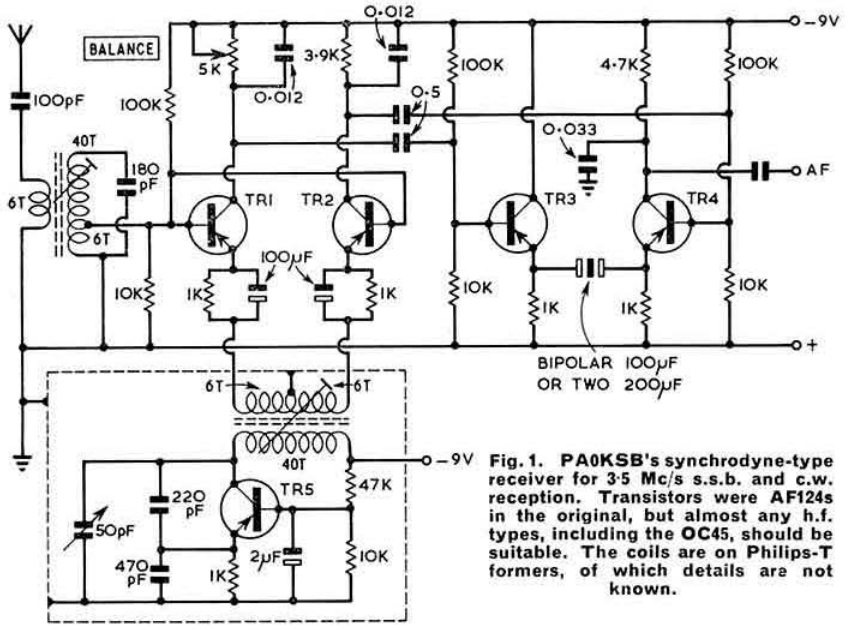


Fig. 1. PA0KSB's synchrodyne-type receiver for 3·5 Mc/s s.s.b. and c.w. reception. Transistors were AF124s in the original, but almost any h.f. types, including the OC45, should be suitable. The coils are on Philips-T formers, of which details are not known.

i.f. strip or second detector, no need for good pre-mixer selectivity, no images or spurious responses, and—at least in theory—the ability to govern the selectivity entirely by the bandwidth of the a.f. circuits, a far cheaper way of achieving high selectivity than a crystal or mechanical filter.

Of course, if it were all as simple as the last sentence suggests we would all have thrown away our superhets years ago. We recall, back in the 'forties, in conjunction with GW3SB trying to get a Tucker synchrodyne circuit to work on a.m. broadcast stations—it must be admitted without much success. But then a lot more is known today about linear balanced mixers, and about phase-locking. And again, for c.w. and s.s.b. reception there is no need for the local oscillator to be locked to an incoming signal. Some time ago, in *TT*, we drew attention to W2WBI's 3·5/7 Mc/s receiver of this type (*QST*, May, 1961), using two well-balanced 6SB7Y valves as heterodyne detector, with a separate, well-screened heterodyne oscillator, but the item did not attract much attention. A valve version using the 7360 beam deflection tube, or the cross-coupled double balanced mixer of *TT* (November, 1966) might well produce some interesting results.

A positive sign that some amateurs are still considering the possibility of using such an arrangement—this time with semi-conductors—is to be found in the Dutch journal *Electron* (January, 1967) where PA0KSB describes the front-end of a simple 3·5 Mc/s receiver for s.s.b. or c.w.; Fig. 1. Two transistors form a balanced detector followed by a form of differential amplifier to produce an unbalanced a.f. output suitable for feeding into a conventional a.f. amplifier, with the fifth transistor used as a heterodyne oscillator. Using a 7m long aerial wire. PA0KSB says that he has been able to hear VE1 stations on 3·5 Mc/s in the winter evenings, and a postscript suggests that PA0PON is giving the idea a try on 28 Mc/s (if my " reading " of the Dutch text is correct.

For c.w. reception, a basic problem is that " single-signal " techniques cannot be used. Nevertheless, it would seem that this form of receiver (and the true synchronous receiver for a.m.) might be worth thinking about—particularly if one could try using FETs or IGFETs for the balanced detector.

A short paragraph in the recent book *Phaselock Techniques*,* discussing this form of reception says: " For various reasons the simple synchronous receiver has never been used extensively. Present-day phaselock receivers almost invariably use the superheterodyne principle and tend to be highly complex . . . " One is left wondering just why it is not used, and whether it would be possible to obtain some of the other low-noise advantages of a phaselock receiver without those entire racks of equipment found in space-tracking stations.

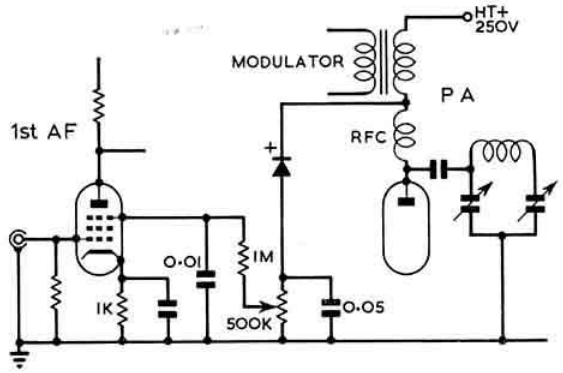


Fig. 2. Outline of G3TFX's overmodulation suppressor and speech compressor.

Overmodulation Suppression/Speech Compression

Richard Fusniak, G3TFX, sends along a useful-looking circuit which he has been using on a low-power a.m. transmitter: Fig. 2. He considers it to be an extension of the form of overmodulation-indicator which relies on detecting the appearance of a negative voltage on the anode of a p.a. valve, a condition which indicates over-modulation. But in G3TFX's arrangement, this condition is used to reduce automatically the gain of the first a.f. amplifier by applying a percentage of the rectified voltage to the suppressor grid of this stage, resulting in the appearance of a " hole " in the audio peaks. In his rig, he finds that too much voltage feedback tends to make the circuit sound " ploppy " but this can be varied by means of the potentiometer. He uses a silicon power diode (1000 p.i.v.) but points out that any suitable diode, including a tubular selenium rectifier should work. Since there will be high peak voltages at this point, regard should be paid to the rectifier p.i.v. ratings, particularly if the arrangement is used on a higher power rig. G3TFX believes that his circuit is an " original," and although a somewhat similar technique has been used on commercial v.h.f. mobile equipments, as described on page 62 of *TTftRA* this differs in certain aspects, and should prove

* *Phaselock Techniques*, by Floyd M. Gardner (John Wiley).

easy to apply, for example, to a 1·8 Mc/s fixed or mobile transmitter.

A rather more complex compressor, capable of considerable variation in the degree of compression, is shown in Fig. 3, which comes from an article by PA0CHD in *Electron* (January, 1967) but which we believe is based on a circuit in the ARRL publication "Single Sideband for the Radio Amateur"; it uses the principle of splitting the a.f. signal and passing one section through a compressor, together with a.f. filtering to limit the a.f. bandwidth and the harmonic content.

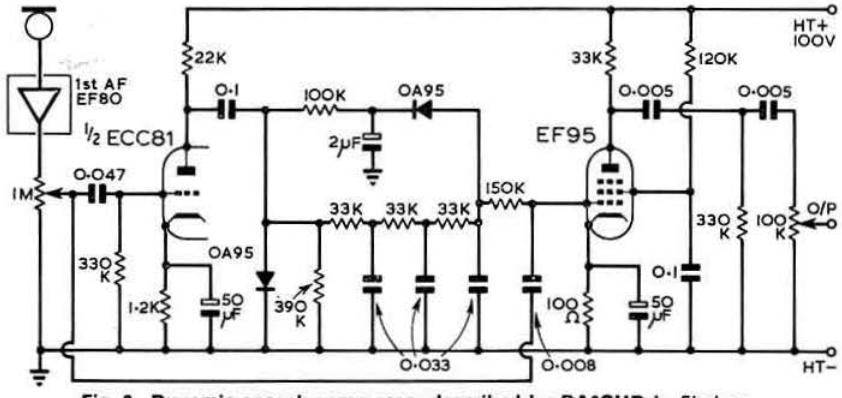


Fig. 3. Dynamic speech compressor described by PA0CHD in *Electron*.

"Field Effect Valve"

Recently we have noticed several mentions in American journals of a new "field effect tube" developed for transmitter applications by Amperex Electronics. Now we see that *CQ* (January, 1967) goes into this development in greater detail, and suggests that these valves will have useful applications in amateur operation, and may in fact prove cheaper to manufacture than conventional power valves having a normal grid structure.

Perhaps the most interesting characteristic is the very high power gains which could well facilitate the use of low-power transistorized exciters to drive these valves up to ½ kW or so. The *CQ* article mentions one prototype tube having a rating of 1·2 kW, anode efficiency of 80-85 per cent with a power gain of 5000 and extremely good linearity; the accompanying illustration seems to be of a higher power unit since it shows full water jacket connections for water cooling. The valves are due to become available in the United States early this year.

CQ says that the electron stream resulting from the application of the proper potential to the cathode is focused into a flat beam by a magnet. The electron stream is then controlled by the electrostatic field between two parallel gate electrodes, providing amplification of the gate signal, in much the same manner as the control of carriers in the channel of a field effect transistor. No conventional grid structure is required—and hence the input power is not limited by grid dissipation. It is not stated how strong a magnetic field is needed for the focusing. A high efficiency cathode is fitted consuming some 30 watts for the 1·2 kW valve.

V.F.O. Topics

In the January *TT* we mentioned briefly the IGFET (MOSFET) v.f.o. described by W2YM in *QST* (December, 1966); this circuit, together with the regulated power supply (which would of course be equally useful for many other semiconductor equipments), is shown in Figs. 4 and 5. It will be noted that the basic oscillator is based on the Seiler form of Colpitts. Of the inclusion of the diode in the gate circuit, W2YM states: "Because the MOS transistor by itself will not provide rectified gate current, a silicon diode is used in the gate circuit. This diode contributes considerably to the frequency stability of the oscillator by making possible a degree of automatic bias comparable to that obtainable with a thermionic valve."

The two-stage negative feedback amplifier which follows the oscillator is designed to minimize the effect of changes in output conditions on the frequency, and R1 provides a convenient means of adjusting the output from the v.f.o. As with any other v.f.o. the stability will depend on the rigidity of the tuned circuit and the minimization of the effects of any thermal changes (which can be kept low since the entire unit is enclosed and dissipates very little power). W2YM quotes some performance figures, indicating a frequency drift of less than 30 c/s in two hours, after a 30-second warm-up period; less than 50 c/s with a 5–5·5 Mc/s version, and about 200 c/s with an 8–9 Mc/s unit.

The RCA 3N128 is not a cheap device; we have seen advertisements quoting a price of about £1 10s. in the States in very large (1000-up) quantities, but a single unit would work out at several pounds a time; nevertheless the future of IGFET-type v.f.o.s seems pretty assured so it is worth studying the circuit tricks. This particular MOSFET has low feedback capacitance (0·2 pF maximum), high power gain (18db typical at 200 Mc/s), a noise factor of 4db at 200 Mc/s and a forward transconductance of about 5000 micromhos.

Some points on v.f.o. stability have been raised in the correspondence columns of *QST*. W2NXS believes that frequency sensitive units—including receiver oscillators, frequency meters and the v.f.o.—should be kept running continuously, and not subjected to normal turn off when not in use. Some of his own equipment has been running for 20 years; and he finds that this keeps the frequency sensitive parts warm and dry, and gives good valve life since there are no sudden switching surges. We recall trying to convince an economy-minded colleague of this at a large wartime receiving station but without much success—he still insisted on switching off any receivers not in use every night. For amateurs, the advantages have to be weighed against how often the station is actually operated.

W6KEV goes into the question of why changes in heater voltage produce such large frequency drifts, and suggests that this is a matter of changes in cathode interface resistance which is very sensitive to temperature: he considers that by adding an unbypassed resistor in series with the interface resistance the change becomes less significant. He also points out again that running valves without anode currents causes the interface resistance to increase rapidly (that is cathode poisoning).

W8DBC stresses that the temperature characteristics of components of nominally the same type differ appreciably and recommends heat cycling the tuned circuit components of an oscillator: typically three cycles between 130° F and 0° F in five minute cycles. He also mentions that contrary to popular belief zero-coefficient ceramic capacitors used in drift-compensating arrangements are actually less stable than those having definite positive or negative coefficients.

Recently, at the Racal factory in Bracknell, we watched numbers of the RA217 transistorized com-

munication receivers (*TT*, July, 1966) in production, and noted that heat-cycling of the critical second v.f.o. is regarded as an important factor in obtaining stability.

Where even greater stability is required, Racal have just developed a new and unique type of add-on unit (the "Racalator") which when attached to a receiver using a Wadley triple-mixer loop (RA17, RA217, etc.) enables any required frequency to be held steady to within plus/minus about 1 c/s—for weeks if necessary! This uses computer-type digital circuits and is likely to cost a little more than the receiver itself—but it shows what can be done, without a full frequency synthesizer.

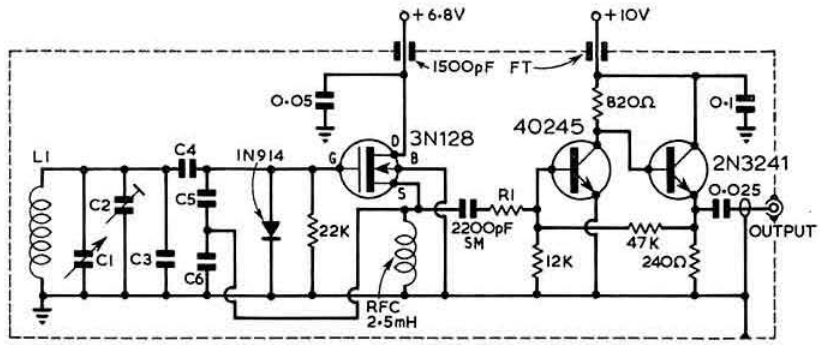


Fig. 4. Circuit diagram of W2YM's IGFET v.f.o. Values for the 3·5 to 4 Mc/s version are L1, 17 turns, 20 B & S, 16 t.p.i., 1 in. diam.; C1, 100 pF; C2, 25 pF; C3, 100 pF silver mica; C4, 390 pF s.m.; C5, 680 pF s.m.; C6, 680 pF s.m.; R1, between 12 K ohms and 47 K ohms selected for 2 volts peak output level at input to transmitter.

G3TFX disagrees with G3GFN's suggestion in a recent *TT* that alloy drift transistors are superior as stable oscillators: he thinks silicon epitaxial types are superior and can dissipate heat better as well. He is using a Seiler-type transistor v.f.o. (2N2369 as oscillator followed by two buffer stages using similar devices) which gives him a stability of about 50 c/s or so per hour from an unstabilized 12-volt supply, though he still feels that a mixer-type v.f.o. using three transistors might prove an even better bet. He regrets that British firms are hesistant to go into production with some transistor devices without having an assured market—his own firm developed a 25 watt, 30 Mc/s power transistor some two years ago but never went into production!

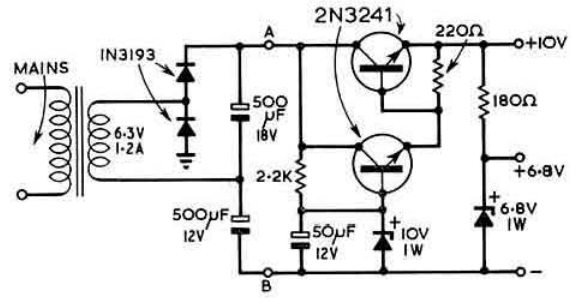
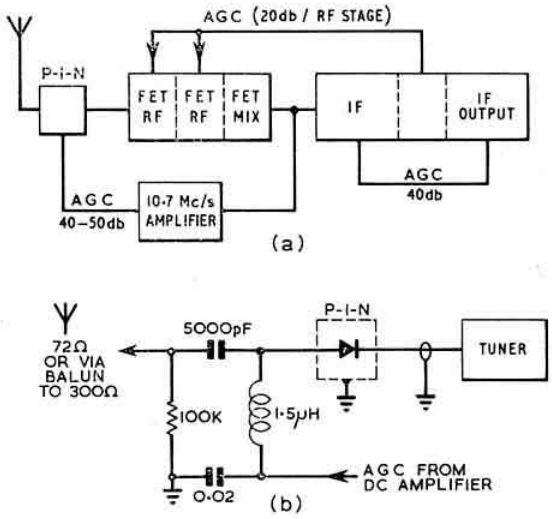


Fig. 5. Stabilized power supply using a heater transformer and voltage doubler. The same arrangement can be used with a 12 volt car battery connected at points A, B. Resistors are ½ watt rating.

P-I-N Diodes

A potentially very useful semiconductor device which up until now has been regarded strictly for professional rather than amateur equipment (on account of its cost) has broken through into domestic high-fidelity equipment, and could thus be getting to the stage where it may well come into more general use. This is the "*p-i-n* diode" (the "*i*" stands for an intrinsic layer between the *p* and *n* regions), a form of semiconductor diode used for switching applications at frequencies up to about 15,000 Mc/s. At very high frequencies it acts as a variable resistor the value of which can be varied over a range of the order of 2·5 to 2500 ohms by means of a d.c. control potential; such diodes are used for r.f. switching, limiting, isolating, duplexing, variable attenuators, etc.; in one condition they can provide a very high degree of isolation; in the other a very low insertion loss.



Ron Glaisher, G6LX draws attention to an interesting article in *Electronics* (22 August, 1966) on a new Fisher high-fidelity v.h.f./f.m. tuner unit (the TFM-1000) which uses both FETs and a *p-i-n* diode; this combination in conjunction with three separate a.g.c. loops is claimed to allow the tuner to cope with signals varying all the way from 1·5 μV up to 0·5 V without overload or spurious responses. Such performance characteristics are intended to cope with the problems of receiving weak stations when close up to a local f.m. broadcast station (and in the United States such stations are scattered over metropolitan areas). But clearly, this is the sort of performance which many a 70 or 144 Mc/s operator would envy.

One of the a.g.c. loops consists of taking off some of the 10·7 Mc/s i.f. signal directly after the mixer, amplifying it and rectifying it to provide an a.g.c. line which governs the attenuation of the *p-i-n* diode connected in the lead between the aerial and the tuner unit: see Fig. 6.

Unfortunately, we have no details of the cost of this *p-i-n* diode (manufactured by H.P. Associates, an affiliate of Hewlett Packard) but the mere fact that it is incorporated in

Fig. 6. The three-loop a.g.c. system in the Fisher TFM1000 results in a dynamic range of some 120db. (*b*) The manner in which the *p-i-n* diode is connected.

a consumer equipment (even one which is clearly not a cheap tuner) suggests that the price is a good deal less than the professional microwave switching devices.

Later information is that the British subsidiary of Hewlett Packard does in fact handle these *p-i-n* diodes and that the cost is in the region of £2.

Here and There

A note in a recent Japanese trade journal suggests that engineers of NHK (the Japanese broadcasting authority) have developed a new type of coiled resistance wiring to reduce ignition interference over the entire m.f. to u.h.f. range. This resistance wire is used for connecting the distributor and ignition coil, as well as the distributor to the spark plugs, and sounds rather more advanced than the carbonized type of h.t. ignition cable. The rather brief description said that the cable has a core made of a mixture of ferrite and polyvinyl chloride (p.v.c.) over which resistance wire is wound as a coil, with an outer insulated covering. It sounds a pretty powerful radiation stopper.

Another idea using ferrite is a compact 6 ft. h.f. (2 to 30 Mc/s) aerial developed by the US Army Electronics Command for vehicular operation, etc. According to a note in *Electronic News*, the 6 ft. aerial operating at 2·8 Mc/s shows a gain of "11db" over a 40 ft. vertical wire excited at the base and tuned against a radial ground system. If that 11db is really correct then the Fort Monmouth people may have a winner. The report adds: " The aerial incorporates several novel techniques: these include optimally distributing the integrated inductive loading, rather than uniform distribution; ferrite loading; continuous permeability tuning, instead of sliding contacts; top feeding rather than base feeding, and isolating the aerial and counterpoise from ground and feed cable." A v.h.f. mobile aerial using a centre-fed system, also developed at Fort Monmouth, has been described in some detail in an *IEEE Transactions* recently, though this does not make such strong claims. We tend to be suspicious of very short h.f. aerials claiming performance equal to that of long ones, but this one sounds interesting.

A letter from P. F. Barry, G3RJS, a radio officer on board the M/V *Buccleuch*, sends along some details of the Marconi " Crusader " marine transmitter which has full s.s.b. facilities both with and without a pilot carrier, in addition to the usual marine modes and with speech compression and clipping, plus some complex exciter circuitry and channel changing arrangements. There is no doubt that some of the modern marine equipment provides most flexible facilities. Some very advanced equipment has gone on to the North Sea oil drilling rigs, including RTTY with independent sideband operation. One gathers that RTTY is likely to come increasingly into use in the mobile marine service.

BOOK REVIEWS

BASIC ELECTRONICS. Prepared by US Bureau of Naval Personnel. Published in the UK by Constable and Co. Ltd., 459 pages. 9¼ in. × 6½ in. Available from RSGB Publications. Price 23s. 6d. post paid.

This book was written for the members of the US Naval Reserves whose duties required them to have a knowledge of the fundamentals of electronics. It commences with a review of valve principles and subsequently deals with their applications in power supplies, amplifiers and oscillators. Following a chapter on tuned circuits the book contains sections on modulation, transmission lines, aerials and propagation. An introduction to transistors is followed by a later chapter reviewing a number of transistor circuits. Final sections deal with elementary communications receivers, radar, electronic test equipment and an introduction to computers.

The presentation of the text and diagrams is clear and the style is easy to follow. However, as would be expected, the book contains US nomenclature, e.g. antenna, tube, B+, etc., but this is not a serious disadvantage. The binding is durable and of a type that allows the volume to be opened flat at any place. *Basic Electronics* is a worthwhile and economical addition to literature likely to interest a radio amateur. R.F.S.

MARINE RADIO MANUAL by G. L. Danielson and F. C. Mayoh. Published by George Newnes Ltd. 621 pages. Price 80s. net.

This comprehensive volume is intended to meet the needs of potential sea going radio officers as it more than covers the syllabuses for the PMG's examinations. The book is a vast step forward from those earlier (and simpler?) days when Hawkhead and Dowsett's textbook, so well known to the veterans, held sway.

There are 32 chapters shared roughly by a dozen on fundamentals, d.c. and a.c. followed by 10 on radio theory and then by chapters on c.r.t.s, aerials, propagation, s.s.b. and D/F, together with specialized chapters on equipment—marine transmitters, receivers, auto alarms, and lifeboat apparatus. Without exception these are all well written and helped by the many clear diagrams interspersed with the text. Apart from its value as a college text, the book should serve excellently for home study. Of great value to the student are the numerous worked examples in the text and the collection at the end of the book of over 350 questions (grouped by subject), and with numerical answers.

Errors are few and minor. The volume might have contained photos of the marine equipment described, but perhaps the increased cost would hardly be justified.

Summarizing, if you intend to study or are studying for a marine radio officer's certificate, then this book is for you. It is confidently recommended as a " good buy." L.E.N.

ELECTRONICS THROUGH EXPERIMENTS. Vol.I—*Components* by E. T. Glas. Published by Philips Technical Library (Cleaver Hume Press). 263 pages with 245 diagrams and illustrations; price 32s.

This text book has nine chapters (218 pages) dealing with valves, semiconductors, photo electronics, resonance, capacitors, coils and resistors, transformers, radiation and wave propagation. The last chapter of 40 pages deals with 10 laboratory experiments each of about three hours duration and consisting of four or five topics which would hardly seem to substantiate the book title.

The book is intended for technical schools, colleges, self tuition and emphasizes the physical standpoint. The standard hovers approximately around ONC. For self tuition the book has the disadvantage of a translation that sometimes is quaint and none too clear, e.g. " In order to obtain a good electronic effect . . ." " The cathode must be able to clear the greater current." " A line of force from the anode now has difficulty in passing through both grids in cascade . . ." " When heated, electrons, which are emitted by the cathode are attracted . . ."

The experiments, which are of formal type, include characteristics of tubes and transistors, amplification, resonance and audio transformers. Lists of apparatus required, the objects of the tests, test arrangements and notes are given, leaving little real exploration and insufficient challenge for the thinking student.

There is no index, although the chapter list is sub-headed. The volume is well produced and printed. L.E.N.

IARU

Region 1 calling

INTERNATIONAL AMATEUR RADIO UNION

Licences in Germany

Visitors to the Federal Republic may now obtain licences of up to three months' duration. This concession applies to Nationals of countries where there is a reciprocal arrangement in force, or where such an arrangement is being negotiated. The applicant for a licence must hold a valid licence in his own country equivalent to the German Licence. Application for a three month licence should be sent at least six weeks in advance to the following address:

DARC International Affairs, Muehlenweg, 27,
5601 Doenberg, Germany.

The fee for a three month licence is DM 14, which should be sent by money order or cheque. The application accompanying the remittance must give the following information:

1. Nationality of Applicant
2. Christian name and Surname
3. Date of Birth (Day, Month, Year). Place of Birth.
4. Home Address
5. Home Call-sign
6. Membership of a Radio Society: Yes/No. Name of Radio Society
7. Photostatic copy of home licence, indicating the class of licence, date of issue and length of validity.
8. Period of three months for which licence is requested.
9. Address to which licence is to be sent.
10. Residence in Germany or type of vehicle and registration number in the case of mobile operation.
11. Declaration that the fee has been sent.

The licence will permit operation on all bands between 3·5 and 144 Mc/s. The call-sign will be the home call-sign followed by the suffix /DL, together with further suffixes /M, or /P, as may be applicable. The German Post Office has entrusted the DARC with the issue of these short term licences, and the International Affairs Office is under the direction of H. Picolin, DL3NE. Copies of the leaflet relating to the issue of these licences may be obtained from G2BVN.

Operation in Andorra

The negotiations for a reciprocal agreement between the United Kingdom and Andorra are unfortunately not yet complete, but it is understood that permission to operate in Andorra may be obtained. Applications with full information and photo-copy of the UK Licence should be sent to M. de Prefet des Pyrenees-Orientales, 66 Perpignan, France.

Intruder Watch

The latest monthly report from the organizer of the *Intruder Watch* (GW3PSM) lists a total of 26 regular intruders. Reports, and in some cases, copies of the material transmitted have been passed to the GPO for suitable action with the administrations concerned. Radio Peking still appears on seven frequencies in the 7 Mc/s band and Radio Budapest continues to drift into the top of what is, on paper, an exclusive amateur allocation. On the bottom end of 7 Mc/s there is an unidentified " noise " station, whose bandwidth is approximately 12 kc/s; this is apparently used for jamming purposes, and is located to the south of the UK, possibly in Northern Spain.

Amateur Radio in African Countries

It is important that the technical and social value of Amateur Radio should be known in the developing countries of Africa and the IARU is asking Member Societies for assistance in this project. The RSGB and the ARRL have made considerable efforts insofar as Liberia and Nigeria are concerned, and both these countries now have National Societies which are members of the Region 1 Division. Quantities of suitable publications have been sent from RSGB and ARRL and, in addition, ARRL has sent equipment for c.w. tuition. Classes have been set up in both countries and there is effective liaison with the Telecommunication Administration. It is vital that this work should be continued, and extended into other African countries where no Amateur Radio organization exists.

Radio Society of East Africa

The latest National Society to become a member of the Region 1 Division is the Radio Society of East Africa, representing Kenya, Uganda and Tanganyika. The Society manned a stand in the Radio and Electronics Show in the City Hall, Nairobi in November last year. The members of the Society, scattered over large areas, keep in touch by means of an RSEA net on 7075 kc/s and on the Amateur Radio Assistance Network which operates in the 3·5 Mc/s band. This network is available at the request of the Postmaster General, Nairobi in case of emergency. Annually at Easter time the Society runs a National Field Day which consists of participation in the East African Safari Motor Rally. This event attracts considerable world wide publicity. The Secretary of RSEA is André Saunders (GM3VLB), who may be contacted at PO Box 5681, Nairobi. 2BVNG

Pen Pals Wanted

The French Society, REF, has informed us that several of their members would like to correspond with British radio amateurs or their families. RSGB members are invited to write in the first instance to Reseau des Emetteurs Français, 60 Boulevard de Bercy, Paris, 12e, France, marking their letter " boite aux lettres."

Can You Help?

● B. Robertson, G3TTV, 9 Holbeck Lane, Cheshunt, Herts, who wishes to purchase or borrow with all expenses paid, circuit diagrams and information in connection with the Hudson AM104A and the TR1986 transmitter-receivers?

A view of the stand of the Radio Society of East Africa at The Radio and Electronics Show in the City Hall, Nairobi, Kenya.

(Photo by Sylvia Story)

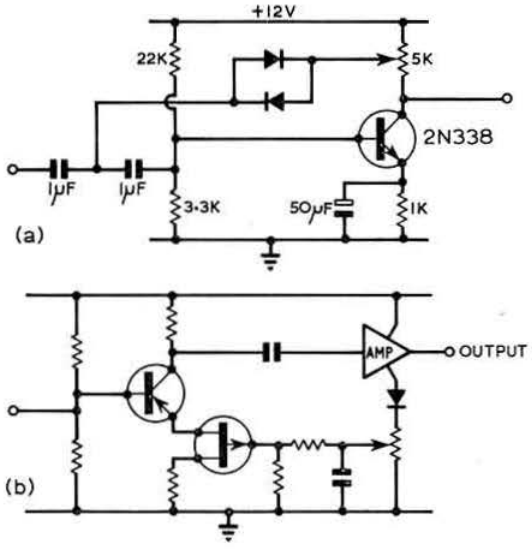
INTERESTED IN AERIALS?
TURN TO PAGE 190

LETTERS TO THE EDITOR

Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.

Tailoring Speech

Following the interesting comments in the December BULLETIN on p. 831 concerning clipping and compression of transmitted speech, two circuits have just appeared in current literature, and these seem to be worth trying. Adjustment of the potentiometer in the first circuit, Fig. 1 (a) (*Elect. Design*, 20 December, 1966) determines the level at which the signal is clipped. The second circuit, Fig. 2 (a) (*Electronics*, 9 January, 1967) is a little more complex and is only given in outline. Part of the output is rectified and fed back to the gate of the FET in the emitter of the first-stage transistor. If the output, with feedback connected, is compared to that existing without feedback, about 30db of compression is achieved before the first stage begins to limit the signal.



The following references (1-5) may also be of general interest on the subject, though unfortunately I only have (2, 5) available here, résumés of the others being found in Electrical Engineering Abstracts, except for (4). Kryter *et al* state that 14db of carrier power can be saved, without loss of intelligibility, with 24db of peak clipping on an a.m. transmitter using 100 per cent modulation. The advantage of clipping the signal for domestic broadcasting using c.s.s.b. is illustrated in Kahn's letter. He also states that studies of speech signals indicate that high-frequency sounds occur immediately following low-frequency, high-amplitude sounds. The high frequencies are required for intelligibility and thus compressors are not necessarily the best choice. Tsuruoka *et al* found that 10db of clipping was acceptable on radio-telephone circuits where, of course, the quality accepted in amateur use is generally not permitted. Probably the most interesting experimental results, however, are in the paper of Ewing and Huddy which considers, in particular, clipping of a s.s.b. signal. The clipper is placed after the balanced modulator and filter. A second filter follows the clipper, both having 3 kc/s bandwidths. A 20 per cent increase in intelligibility was obtained at clipping levels of 12 to 24db at a peak signal-to-r.m.s. noise voltage ratio of 3db. This improvement decreases slightly at better signal-to-noise ratios.

Having written this I must admit to not using these modifications in my KW2000A as yet! However, this may be reserved as a small project for one of the very cold winter weekends one gets in Quebec.

(1) K. D. Kryter, *et al.* " Premodulation Clipping in A.M. Voice Communication," *JASA*, p. 125, January 1947.
(2) L. R. Kahn. " Use of Speech Clipping in S.S.B.," *Proc. IRE*, p. 1148, August 1957.
(3) Y. Tsuruoka, *et al.* " On the Application of a Speech Clipper to an S.S.B. Radio-Telephone System using VODAS," *J.Inst.Elec.Comm.Eng.Jap.*, p. 1211, September 1962.
(4) W. K. Squares, E. T. Clegg. " Speech Clipping for S.S.B.," *QST*, p. 11, July 1964.
(5) G. D. Ewing, N. W. Huddy. " R.F. Clipping and Filtering to Improve the Intelligibility of Speech in Noise," *IEEE Trans*, AU-14, December 1966.

C. R. FRY, VE2ARO

Quebec 6, P.Q., Canada.

Transistor V.F.O.s

I join with G3KOV (p. 42, January BULLETIN) in wondering why people use valve oscillators, but I believe that fear of the unknown, rather than poor performance, is their reason.

Some two years ago I constructed a 7 Mc/s " Synthetic Rock " to W3JHR's design (*Technical Topics for the Radio Amateur*, p. 49, Fig. 33). This drifted 300 c/s in the first half hour from switch-on without any attempt at temperature compensation. As changes due to the transistor seemed negligible, they remained unchecked until now.

Most oscillators mentioned in the columns of the BULLETIN are very similar, i.e., they are all series tuned, and differ only in the position of the variable tuning capacitor (which is only a small part of the whole tuning capacitance) and in the choice of which electrode of the transistor is earthed at r.f. Consequently, the following remarks based on experience with the W3JHR design will apply equally to the Colpitts, Vackar, etc.

It is my opinion that the correct design procedure is to use a single transistor oscillator with the amplitude controlled by nonlinearity, for the following reasons:

(i) Resistive loading at the transistor base has negligible effect, and is not improved by a subsidiary amplitude stabilizer that controls the emitter series resistance, since changes in the latter, multiplied by the transistor current gain, appear at the base terminal. Also the transistor operates at a defined mean base current so that the change in a.c. input resistance with oscillation amplitude is much less than in the corresponding valve circuit. The only merit in the subsidiary stabilizer is reduced distortion, which in theory improves stability by reducing non-linear effects due to interaction between harmonics and fundamental.

A 5 per cent *current* change through the transistor in my " Synthetic Rock " (which will change the base input resistance by a similar amount) produces less than 10 c/s frequency change.

(ii) The principal defect of the transistor is its output capacitance. This is generally about 10 pF, and is inversely proportional to collector-base voltage. A 5 per cent change in collector *voltage* to my " Synthetic Rock " shifts the frequency by 100 c/s.

To minimize this effect, stabilize V_{cb} by suitable choice of bias circuit, avoid using another transistor with its capacitance as a constant current source, but do use the largest possible collector-emitter and base-emitter capacitors consistent with oscillation.

But, of course, there is no point in worrying about these details unless the oscillator and its tuning drive are " built like a rock " and put in a box of their own, away from sources of heat.

R. C. MARSHALL, G3SBA

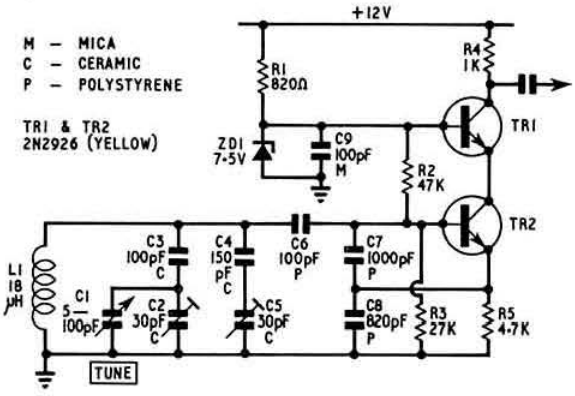
Harpenden, Herts.

I would like to bring to readers' attention some points regarding transistor v.f.o.s. It seems that most circuits described in " Technical Topics " use a single transistor oscillator followed by an emitter follower buffer. Drift in these seems to come from the usual sources, i.e. (i) temperature changes, (ii) poor isolation and (iii) supply voltage changes.

The first of these seems to be the most serious in transistor units, due almost certainly to the relatively large change in collector current with temperature and therefore a corresponding change in the drive conditions and the collector-base capacitance of the transistor.

Secondly (poor isolation) the use of an emitter follower as a buffer at frequencies above several hundred kc/s is not to be recommended because at higher frequencies the base-emitter capacitance can have an unwanted coupling effect.

Bearing these in mind an oscillator was built using the accompanying circuit.



T1 and T2 form a cascode pair with the oscillator circuit in the bottom half. As in the valve cascode circuit, isolation be-between the input (base TR1) and output (collector TR2) is almost 100 per cent and loading the output with 3000pF caused a frequency shift of only about 5 c/s in 3 Mc/s. Even this was thought to be due to stray coupling because the circuit was not screened at the time.

Temperature effects have not yet been fully explored because of the lack of suitable facilities, but it is worth noting that the circuit built on a piece of Veroboard and not screened in any way, was left on the bench for two hours, and in that time was found to have drifted only 100 c/s from the 3 Mc/s setting.

The base of TR2 is held at +7·5 volts by means of a Zener diode, making TR2 act as a constant current source. Changes in the 12 volt line therefore make very little difference to the emitter current of TR1 and the frequency shift is about 100 c/s for ±1 volt change. As shown the circuit is biased for an emitter current of 500 μA but for operation at frequencies above about 6 Mc/s it may be necessary to raise this to 1 or 2 mA.

Unfortunately time has not allowed a full investigation of the circuit in order to explore its full potentialities, but it may well work with the BRS25769 Vackar and almost any other network.

Do not ignore the straight transistor cascode r.f. amplifier, it is one of the best configurations there is.

R. GOULDSTONE, G3TAG

Great Shelford, Cambridge.

Class B Licences

In reply to those so-called " amateurs " who criticized G8AKA and his objective, I would like to express my shame of being associated with men who are trying to ruin, for ever, the spirit of Amateur Radio.

It took many years for the Class B Licence to be allowed. It took a long hard struggle (as always) to convince those concerned that a definite need existed for such a licence.

Many of us 8 plus 3 types are disgusted by the attitude that is often adopted by Class A Licence members, examples being " They would cause interference," " They haven't enough experience," " They are too lazy to learn Morse," etc. *Does passing the GPO Morse Test erase all these faults?* Of course not. There are many Class A Licence operators who would be put to shame by one of us, judging by some of the transmissions I have heard as an SWL in the last ten years.

No gentlemen, let there be peace between the two classes of A and B Licence holders. We have passed our RAE and many of us have been SWLs for years. The main aim in obtaining an 8-plus-3 licence is either to operate on phone only on u.h.f., or to use as a stepping stone for a Class A Licence. This is surely a good apprenticeship for the spirit of Amateur Radio and not a setback.

The case for preventing us operating on phone on 2m is very weak. Surely our *main* aim in life is to *retain* and increase the frequency allocations of the radio amateur, disregarding the class of his licence. By allowing us to operate on 2m there is a good chance of our retaining it as an amateur band. If certain individuals persist in preventing this allocation being granted then commercial operators could put forward a good case for using the band.

Finally, I would like to slap on the back those chaps, like G3FPR, who, having gained their own A licence, can appreciate the difficulties of being a B licensee. Having a B licence is not an easy road to an A licence, but the most difficult one in the world.

IAN MACDONALD, GM8AVM

Paisley, Renfrewshire.

I have rather strong views regarding Class B licences, and to read G8PD's suggestion in the January edition of the BULLETIN seemed like hearing a voice in the wilderness.

This has been my argument since the B licence came into existence. As can be seen from my call-sign, being relatively newly licensed, I too was eligible for a Class B licence having passed the RAE, but found the terms of it completely unattractive. In my view Morse is essential to a " fully fledged " operator and can mean the saviour of many a DX QSO in which phone or other modes of transmission have failed due to adverse conditions. The B licence, in effect, deters would be Class A licence holders from using c.w. These poor G8s are restricted to a band where phone is the order of the day and cannot try or practise c.w. on that band even if they want to.

Obviously the G8 gains a great amount of experience of operating and transmitter technique, but only with a microphone in his hand. I am sure that the majority of B licence holders hope eventually to become A licence holders but they will not do so if their leisure hours are spent constructing 70cm equipment or operating either from their home station or from some other kind A licensed station under the supervision of the licensee, chatting to the Europeans on 20m (*phone again*, of course), when those precious hours could be wisely spent listening to or practising Morse which would benefit them greatly.

I agree that the introduction of the B licence has stimulated activity on 70cm and I take my hat off to any G8 who is only interested in building and developing u.h.f. equipment and not really bothered about the h.f. bands, but those who take out a B licence to tide them over until they pass their Morse test must surely be wasting their time if their main interests lie on the h.f. bands.

To give the G8 2m would, in my opinion, only serve to make matters worse. I agree that the majority of v.h.f./u.h.f. operators use phone but this is only true for everyday, local or semi-local contacts. Anyone who has listened on 2m during above average conditions will agree that one can hear stations, who normally use phone, fishing for the rare ones on c.w. and anything (any mode) goes during an opening. Even v.f.o. stations have difficulty finding a clear channel during openings.

Therefore, I fully endorse G8PD's suggestions and hope that steps will be taken in the right direction.

D. ROGERS, GW3UOO

Ponciau, Wrexham

Class B Licences and Intruders

I have followed the reply made by G8ANU to the suggestion by G8AKA in the November BULLETIN with considerable interest.

Mr Howard suggests that the possible encroachment of the amateur v.h.f. and u.h.f. bands by commercial operations is a good excuse for dispensing with the Morse test for operation on the 2m band. Surely by this standard the actual blatant pirating which occurs on amateur h.f. bands is far more serious.

The 40m band is openly invaded by broadcasters who have no right to be there. At least we can hope to defend the v.h.f.

and u.h.f. bands at home from national interests, but one day the 40m band may no longer be permitted internationally. Such a loss will be far greater than a few Mc/s of the u.h.f. bands.

Doubtless 500 operators more on 2m would give a strong argument against band-pruning in favour of the commercial operators. However, I do believe that 500 extra users of the 40m band, preferably c.w., would be even better.

Since the publication of G3KGU's letter in September, no letter of thanks from a G8 or A seems to have been published in the BULLETIN for the RSGB Slow Morse transmissions. They are doing a good job to teach people Morse—if they (G8s and As) will only listen. Does Mr Howard not find them good enough? I cannot believe that.

E. P. G. THOMPSON, A5191

Romford, Essex.

Operating Standards

I was delighted to read G3BA's letter in the January issue, since I have shared his views for a number of years. However, I should like to put one or two points into better perspective in anticipation of the flood of heated reactions which undoubtedly will follow!

In the first place G3BA advocates the universal adoption of VOX control. Although this would make a big difference to the amount of " information transfer " it is obviously a very idealistic approach and, rather like a band plan, it loses much of its benefit unless everyone can be relied upon to adopt it. Cross-band duplex operation may provide a simpler solution in practice, and there is really plenty of room, especially on v.h.f.

Secondly, one must distinguish between " first " contacts and those with whom one is acquainted. G3BA's example of the call from the States implies the latter, together with a duplex mode of operation, whereas the " gobbledygook and baby talk " is rarely heard between individuals who are acquainted. It is meaningless to look for any comparison in everyday life with the unique procedure of holding lengthy and entirely one-sided " conversations " with someone whom one has never met! This (unfortunately?) is one aspect of Amateur Radio which has to be accepted.

The use of jargon is common to all specialist hobbies, and although a great deal can be replaced by plain English, I wonder if G3BA can find an alternative to " QSL card "?

The real cause for criticism surely stems from the excessive length of overs and the assumption that the other chap only wants to talk about radio. Once you have mentioned that you are using a receiver with a cardboard loudspeaker, a transmitter with a p.a. and a microphone with an insert, you have done your duty. Launch immediately into the field of ghosts, or coal mining, or dowsing. Better still, open the BULL and have a go with the " Letters to the Editor "—you may eventually be inspired to write one!

JOHN WHITNEY, G3MFB

London, SW20.

I think Mr Douglas' views are long over due. As radio amateurs, deep down I think we all know our operating standards have gone down and down over the years.

We would all do well to read the ARRL Amateur Radio Code by Paul M. Segal; although he wrote it many years ago, it is still applicable; maybe the BULLETIN could find space to print it.

Please don't forget it's only a hobby, and don't forget Paul Segal's words.

F. ROSE, G2DRT

High Wycombe, Buckinghamshire.

The " Amateur Code " referred to by Mr Rose is printed in every edition of the ARRL *Radio Amateurs' Handbook*. The following is a slightly abridged version of the Code:

" *The Amateur is Gentlemanly* . . . He never knowingly uses the air for his own amusement in such a way as to lessen the pleasure of others.

The Amateur is Progressive . . . He keeps his station abreast of science. It is built well and efficiently. His operating practice is clean and regular.

The Amateur is Friendly . . . Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance and co-operation for the broadcast listener; these are marks of the amateur spirit.

The Amateur is Balanced . . . Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community."

—EDITOR.

G3BA has said it all. I want to give him my wholehearted backing, but after reading his letter several times, find that I have absolutely nothing to add to it or subtract from it. I agree entirely and think it high time amateurs took a long hard look at this aspect of their hobby. It needs a Spring Clean.

F. R. ROBERTS, G3OSI

Havant, Hants.

I could not agree more with Mr Douglas. In fact, this was very much the gist of my argument with an amateur colleague only last week. It is of interest to note that he was licensed pre-war and would not agree to the very points that Mr Douglas makes, mainly because he spends most of his operating time on c.w., and I do not blame him. In my opinion, the standards set by c.w. operators in general are much higher than that of the average phone operator. Personally, I think the main reason for bad operation on phone contacts can be summed up as follows:

(*a*) Lack of real interest in Amateur Radio and its purpose.

(*b*) Not realizing the possibilities of the correct use of Amateur Radio.

A few minutes listening over many of the bands indicates that the sole purpose of some of the operators is to make contact and break it off as soon as possible to help fill up the log book.

My own experience is that I can " stick " no more than one week in six of phone operation. I have got only one word to describe the standards in general: "pathetic." A typical example of one of my most recent contacts " Your report here OM S9 plus 20, I repeat your report here OM S9 plus 20. No QRM, no Queen Roger Mary. The name here is David. I spell D for dog, A for Able, V for Victor, etc., etc." It is quite obvious that if the operator at the other end had stopped to think, he would realize that it is pointless in repeating and phonetically spelling everything he says, when I had given him practically the same signal report on my first over.

One other type of operator is he who, after the usual preliminaries of signal reports, equipment line-up, etc., taking about five minutes to tell you the fact that he has a receiver, a transmitter and an aerial, signs over, whereupon one tries to start an intelligent conversation, asking numerous questions or bringing up matters of technical interest, passes it back only to find far from answering any questions, or even mentioning any of the points raised, says " Well OM thanks very much for the contact, we!! (meaning I) hope to hook up with you again in the near future, once more thanks very much for a very pleasant contact, etc." I ask you, the very word pleasant would seem to indicate at least a development of knowing something about the other operator, but how can one build up any form of friendship or basis for a future contact, when all one knows is that he has a transmitter, a receiver and an aerial.

The foregoing is one of the reasons why I now spend nine-tenths of my amateur activity time in building, development and experimentation, and the remaining fraction in proving that the equipment operates.

One last point to expand on Mr G3BA's letter; is it really necessary to have the same c.w. type abbreviations on QSL cards when it would cost no more to have the full words written and at the same time would obviate the necessity for the insertion of other useless and pointless information to fill up the card. After all, the purpose of a QSL card is to confirm the contact, i.e., station, date, time, frequency and signal report. The irony of it all is that there is more information in most cases on the QSL card than is ever received in the actual contact.

T. S. COOPER, G3SEC

Steeple Morden, Royston, Herts.

May I be allowed, as a " low level technician," to voice a humble opinion on Mr Douglas' strictures regarding operating standards?

His avowed aim for 1967 is to encourage us to instal VOX or BKIN facilities so as to (quote) " promote conversation in order to get more sensible information exchanged." What a presumptious assumption!

Surely being equipped for BKIN or VOX operation does not indicate automatically a source of " more sensible information! " On the contrary, some of these " conversational VOX " contacts are boring in the extreme. Often they comprise little more than mundane muttered comments, banalities, and the continued use of hackneyed expressions and pedestrian cliches, usually with no call-signs mentioned.

Being essentially a listener and not particularly fond of the sound of my own voice, I prefer to sit back and hear what the

" other fellow " has to say, and to give him the opportunity of saying it however long his transmission may take. In any case, to suggest to him that he may be holding the transmission too long would surely not be the best of good manners and would seem to indicate a disinterested attitude to what he is saying.

Mr Douglas' attempt to equate contacts over the air with telephone conversations appears to suggest that one's transmitting equipment should be used as a substitute for the telephone. Surely ones does not go to the trouble of obtaining a transmitting licence merely to avoid renting a telephone?

Incidentally, I have yet to meet the " casual observer " (or SWL) who listens on the amateur bands and classes *all* amateurs as " a lot of overgrown schoolboys " devoid of self-respect. (Presumably those using VOX or BKIN are exempt from this classification.)

As it appears Mr Douglas is becoming unduly sensitive to what casual observers or SWLs may or may not think about the operating procedures of amateurs in general, then I feel he may well be taking this fascinating hobby of ours just a little too seriously.

HAROLD L. MCALLISTER, G3OEJ

Bredbury, nr Stockport, Cheshire

QSL Cards

I was very pleased to read the letter from G2MI concerning QSL cards (January issue), and I am very glad that at last somebody in an influential position is trying to lay down more precise rules about sending QSLs.

But what about the poor BRS stations, where it has got to the stage where they have to have hinting gestures and reminders printed on their cards so that amateurs may see they do want a QSL card. " Pse QSL " printed on cards seems to be forgotten and unnoticed.

I heartily agree with the " little rule 5 " but believe it should be made a little stronger.

NICHOLAS CHANTLER, BRS21869

Macclesfield, Cheshire.

With reference to the letter from G2MI in the January 1967 issue of the BULLETIN, those who QSL directly or indirectly, and who keep envelopes with QSL Bureau Sub-Managers as a matter of course, should acquaint themselves with the Regulations pertaining to the Post Office Preferred (POP) Range of Envelopes and Postcards, dealt with by Leaflet PL 197 3/66, due to be implemented from 1 July, 1968, and not as far away as you might think.

Envelopes should be:

(i) At least 3½ in. × 5½ in. (90mm × 140mm) and not larger than 4⅞ in. × 9¼ in. (120mm × 235mm)
(ii) Oblong in shape, with the longer side at least 1·414 times the shorter side.
(iii) Made from paper weighing at least 63 grammes per square metre.

Envelopes outside the preferred range may still be used, and mail weighing more than 2 oz. will be unaffected by the choice of envelope, but mail weighing up to 2 oz. posted in envelopes outside the preferred range will be charged at the next higher rate, for instance:

In a Preferred Size envelope:
Letter Rate 4d. Printed Paper Rate 3d.
In a Non-Preferred Envelope:
Letter Rate 6d. Printed Paper Rate 5d.

The minimum size qualifying for Postcard Rate will be raised to 3½ in. × 5½ in.; the present maximum size of 4¼ in. × 5⅛ in. will, however, remain unchanged. *Sizes within these limits must conform to the length/width ratio for Post Office Preferred (POP) range envelopes.* All other cards will be treated as letters (or Printed Papers if admissible at the Printed Paper Rate) and as if they had been posted in an envelope of the same dimensions as the card itself.

The moral to all this (and there are more facets to the new regulations than those quoted) is that not only should radio amateurs both at home and abroad take notice of G2MI's letter (who else is better fitted to write on QSL matters?) but those amongst them who buy cards in bulk, or who belong to that fraternity who indulge in cards of odd sizes, and even odd shapes, should, when re-ordering, make sure that the new cards are not going to involve themselves or any one else in an unnecessary increase of 50 per cent postage concerning an envelope, or 100 per cent concerning a postcard on whatever the postage rate might be in 1968.

No apologies are made for writing on a subject which should be common knowledge here at home, but conversation with other radio amateurs has made it clear that the general public does not seem to be aware of these impending changes. However there is now no excuse—" Be Post Office Prepared—Buy Post Office Preferred." It's not too early to start right now.

E. G. KENDALL, G3APA

Coventry, Warwickshire

Mr Milne's suggestions in the January issue of BULLETIN are admirable. Until recently I have sent a card to each and every new station worked; now I ask, " Do you want a card? " If so, one is sent. No snags, just good plain commonsense!

JIM MACINTOSH, GM3IAA

Cradlehall, Inverness.

QSL Cards and Subscriptions

I would heartily endorse Mr Milne's letter in the January BULLETIN on the subject of QSL cards. I would like to add one further rule: If you do not QSL, say so: there is nothing to be ashamed about, for there are quite a few good reasons why you shouldn't. (N.B. I do QSL and will gladly do so upon being asked, especially by SWLs.)

I would also endorse Mr Ballance's letter to a certain extent. Certainly those members still at school should be allowed a reduced subscription (say associate fees together with associate benefits). I'm not too sure about those at universities, etc., who get reasonable grants (better than many young apprentices earn).

However, the aim of the Society should be to retain as many members as possible and if a reduction of fees in certain circumstances is desirable, then this should be done.

J. N. HELSBY, G3SAA

Chelmsford, Essex.

Line TVI

Apparently the GPO attitude towards interference to Redifusion wired sound and vision system by Amateur transmissions is that the amateur is not to blame and the Company must make their own arrangement for filters.

The Postmaster General, at the beginning of December, confirmed that the Post Office are working towards a " Communications Lead " system to distribute radio and TV signals. At present the Post Office is not certain whether the system used will be broadband v.h.f. or h.f. Broadband seems to have that old familiar ring . . . " Everything plus the kitchen sink."

I wonder if the GPO will take the same attitude to wired systems when they run one.

A. G. TREGALE, G3LMT

Exeter, Devon.

Assistance for the ATC

I was recently at a meeting of the officers commanding the ATC Squadrons in the county of Staffordshire. In my roll of Signals Officer, Staffordshire Wing, ATC, I have the task of trying to equip and find operators to undertake the duties of operating the ATC W/T Network.

If an amateur could go along to any squadron with, say, a TCS12 transmitter-receiver and operate /A, he could interest the cadets in activity on 160, 80 and 40m, and would also be able to use the same rig on the ATC W/T net on 4 to 5 Mc/s. Most ATC units have plenty of space for aerials.

I would be pleased to hear from anyone who is interested in helping any of the squadrons listed below. I would give him such information as the address of the nearest ATC Squadron to him, the address of the officer commanding, and a list of the equipment (if any) that would be available for his use.

The Squadrons in need of amateur assistance are:

196 Walsall, 239 Meire, Stoke on Trent, 240 Darlaston, 351 Burton on Trent, 395 Stafford, 425 Aldridge, 435 Newcastle (Staffs), 1047 Wolverhampton, 1122 Tamworth, 1290 Bloxwich, 1871 Rugeley, 2078 Boscobell, 2132 Sedgley, 2156 Rowley Regis, 2263 Tipton Grammar School, 2352 Stone and 2415 Penkridge.

V. J. REYNOLDS, G3COY,
Sigs. Officer 238 Squadron ATC,
Wing Signals Officer, Staffordshire Wing.
25 Yoxhall Avenue,
Harts Hill, Stoke-on-Trent, Staffs.

(More letters on page 185)

Single Sideband

By G. R. B. THORNLEY, G2DAF*

Alignment of a G2DAF-Type Receiver *Part 2*

DURING initial listening tests, it was clear that the G2DAF-type receiver built by G3OCX was very noisy and had excessive gain. An accurate determination of white noise output—both overall and from each stage in turn—was therefore necessary in order to know how to proceed with subsequent circuit adjustment and alignment. The measurement method adopted will now be given in detail.

V1 and V2 were replaced in their holders and allowed to reach their operating temperatures. The normal receiving aerial was removed and the aerial input socket was loaded with a 75 ohm dummy load consisting of a Belling-Lee L734/P plug to which had previously been connected a 75 ohm carbon resistor (this resistor should be located within the plug body in order to be able to keep connections as short as possible and prevent stray signal pick-up). The external loudspeaker was disconnected and a 5 ohm 2 watt carbon resistor (this may conveniently be made up with 10 ohm 1 watt resistors in parallel) was connected across the receiver low impedance output terminals. The Model 8 AVO meter switched to the 250 volt a.c. range was connected across the output transformer primary connections. Panel controls were set as follows: R.F. GAIN at MAX; AUDIO GAIN at MAX; SIDEBAND SWITCH at LSB; A.G.C. SWITCH TO OFF; Q MULTIPLIER TO OFF; BAND CHANGE SWITCH TO 20M; TUNING DIAL TO 14·25 Mc/s.

The output meter reading was noted, then each valve was removed from its socket in turn, starting from V1, at the same time making a note of the change in output meter indication. The figures obtained are given in Table 1.

With an output transformer ratio of 35 : 1 and an external load of 5 ohms the primary impedance is 5,000 ohms. So 100 volts across a load of 5,000 ohms is equal to 2 watts output. As the first four measurements in Table 1 are all greater than 100 volts it is apparent that the output valve is being fully driven to its maximum output by white noise alone. It will also be noted that as V1 and V2 are removed the output power actually goes up—not down as would be expected—indicating that an earlier stage was also being overloaded.

The final figure is the white noise from the grid of the first 455 kc/s i.f. valve onwards (V1, 2, 3, 4, and 6 having been removed) and 17 volts denotes excessive i.f. gain. Inspection of the i.f. transformer cans (IFT1, IFT2 and IFT3) showed that the dust cores were positioned well inside the formers, indicating that the transformers had been aligned with the dust cores on the inside of the pie windings.

At this stage it may be of value to discuss in greater detail the position of a dust core relative to the winding and its importance in relation to correct circuit alignment. As an example, let us consider the selection of a 20m coil required to resonate with a shunt capacitance of 42 pF. Inspection of an inductance, capacity and frequency chart will show that at 14 Mc/s with 42 pF capacity the inductance will need to be 3 μH. An 0 BA dust core in a thin walled 0·3 in. diameter coil former will give an inductance ratio of about 2 : 1. The circuit designer would therefore select a coil of 2 μH minimum and 4 μH maximum value—this range is given with a 21 turn winding spaced to $\frac{9}{16}$ in. long.

Fig. 1 shows the relative positions of the dust core for minimum inductance at " A," and for maximum inductance at " B." It is quite apparent that as the core is screwed into the former from the top—at some position between " A " and " B " the inductance value will increase to 3 μH and the circuit will be correctly tuned to resonance; this is shown at " C." It is also obvious that if the core continues to be screwed into the former it will go through the maximum inductance value and reach a *second* resonance point of 3 μH as it emerges on the other side of the winding.

Exactly the same conditions apply to a pie winding, and Fig. 2 shows a representative modern type of 455 kc/s i.f. transformer where two coils (a primary and a secondary winding) are coupled together with a spacing of $\frac{3}{8}$ in. Maximum inductance occurs when the dust core is fully within the pie, and minimum inductance when it is completely outside the pie as shown at " A." The transformer will be made with internal shunt capacitors chosen to give correct resonance at an inductance value mid-way between these two extremes. The transformer will therefore tune correctly when the dust cores are going into the coil—at a position similar to that shown at " B." It is also equally obvious that there will be a *second* resonant position where the core is coming out of the pie—on the other side—as shown at " C." However at " C " the adjacent ends of the two cores are closer together than the adjacent faces of the two pie windings. The transformer coupling has been considerably

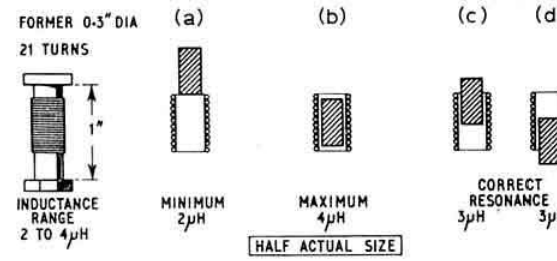


Fig. 1. Diagrams showing the physical position of a standard 12·7mm 0 BA dust core in relation to the coil winding and the effective inductance value.

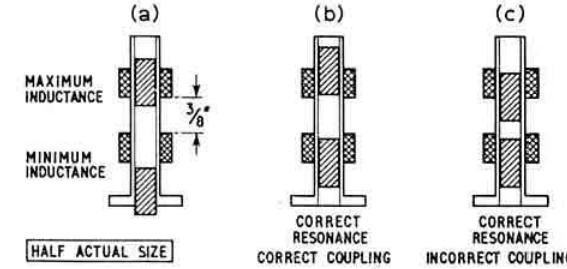


Fig. 2. Diagrams showing standard dust cores in relation to pie windings in a modern 455 kc/s i.f. transformer. The top winding of " C " has been correctly resonated, but due to the core being at the second inner resonance position, the transformer coupling has been greatly increased.

* 5 Janice Drive, Fulwood, Preston, Lancs.

increased (at the expense of the bandwidth) and there will be excessive stage gain. Further inspection of the diagram of " C " will show that if the constructor had continued to screw the bottom core into the former, he would never be able to reach the second resonance point because the top face of the dust core would butt against the bottom face of the top core first. Unfortunately he would not know this because as the cores moved closer towards each other the output of the receiver would rise due to the increase in the transformer coupling coefficient. For this reason it is highly dangerous to attempt i.f. alignment on random off-air signals or on band background noise.

A receiver or a transmitter relies entirely on the various tuned circuits to effectively pass the wanted signal and effectively reject the unwanted and spurious signals. Assuming that there is no fault in component values or in circuit wiring, the final performance of a receiver or a transmitter can be made or broken in the tuned circuits. Correct alignment is vitally important; the constructor must be *certain* that every tuned circuit is reasonating correctly. The following rule must be enforced at all times: " A tuned circuit is only correctly aligned when it is possible to obtain resonance at *two* positions of the dust core. If there are not two resonant positions—there is something wrong and the fault must be found and corrected."

Continuing with the alignment of the receiver; V4 was replaced in its holder. The signal generator was set to the mid-band frequency of the mechanical filter and its output lead connected to the signal grid of V4. The three i.f. transformers were re-aligned, in each case with the dust core on the outside of the pie winding (at the first resonant position). V4 was then removed from its holder and the signal generator disconnected and switched off. A note was made of the AVO meter reading; V4 replaced in its holder and the change in meter reading noted, followed by replacing V6. The readings obtained are shown in Table 2.

The rise in noise output from 7 volts to 35 volts (14db) indicates that the v.f.o. is behaving as a noise generator and that the injection into the mixer V4 is most likely high. Accordingly the value was measured with the thermonic diode probe of a Salford Valve Voltmeter connected to the injection grid of the mixer and found to be 2·4 volts r.m.s. This is obviously an excessive amount, so experimentally the 47 pF injection coupling capacitor was transferred to the cathode pin of the v.f.o. valve V6. The white noise output voltage reduced from the previous 35 volts to 5 volts (—17db). At this stage V1, V2 and V3 were replaced in reverse order; the white noise output figures are shown in Table 3.

As a check the two signal frequency tuned circuits were detuned from resonance with the " Preselector Tuning " panel control knob. The white noise output dropped from 11 volts to 4 volts—this proves conclusively that the r.f. stage is determining the receiver overall signal-to-noise ratio.

The receiver was now in the position where it was possible to hear the thermal noise from the first tuned circuit as this was tuned to resonance, and the total white noise output was an acceptable figure. It now remained to align the signal frequency circuits on each of the six amateur bands. The AVO meter and the 5 ohm dummy load were removed from the output circuits and the loudspeaker was reconnected. The 75 ohm dummy load was removed and the Marconi TF 144G signal generator fed into the aerial input socket. After setting the output attenuator to a convenient value—100 μV—the signal generator was set to the mid-band frequency on each of the six ranges and the front end coils adjusted for resonance.

(To be continued)

TABLE 1

White Noise Output	
All valves in use	120 volts
R.f. valve, V1 removed	125 volts
Mixer valve, V2 removed	130 volts
Oscillator valve, V3 removed	135 volts
V.F.O. valve, V6 removed	35 volts
Mixer valve, V4 removed	17 volts
(for the last two readings the AVO was switched to the 100 volt a.c. range)	

TABLE 2

White Noise Output	
Mixer valve, V4 removed	3 volts
Mixer valve, V4 replaced	7 volts
V.f.o. valve, V6 replaced	34 to 37 volts (meter pointer swinging)

TABLE 3

White Noise Output	
Oscillator valve, V3 replaced	4 volts
Mixer valve, V2 replaced	4 volts
R.f. valve, V1 replaced	4 volts
V2 grid circuit resonated with dust core adjustment	8 volts
V1 grid circuit resonated with dust core adjustment	11 volts

More Letters to the Editor

(Continued from page 183)

RAE Syllabus

Since September last, I have had the pleasure of giving, for the first time, a " crash " course of instruction to about ten students who took the December examination for the Amateur Certificate. I devoted part of the course to the solution of past examination numerical questions and I found some of them to be astounding. One involved a 1 Henry inductance having a resistance of more than 3000 ohms! I would have thrown such an inductor straight in the dustbin.

Another problem involved a capacitance of 3·18 microfarads . . . 3·18 . . . did you ever read such nonsense?

But the crowning futility, in my opinion, was in the latest paper; involving joining a 6 volt 1 watt lamp to four dry cells connected in series. Now what has that to do with Amateur Radio? I suppose it is what all the 2m enthusiasts are doing when the band is dead.

May I plead, through you, Sir, that those who have the responsibility for setting the numerical questions should study the subject and choose situations and figures that have some practical relationship to it. Furthermore, let us have in the preamble to the examination paper—" take π as 3 "—involving thereby an error of less than 5 per cent—better than most of the resistors that we use.

D. J. CAVE, G2FMJ

Potters Bar, Herts.

Delivery Dates

I too have had occasional trouble with deliveries but in fairness to many firms, I would, inter alia, wish to congratulate Jackson Bros. Ltd., P.C. Radio Ltd., H. L. Smith and Co. Ltd., Imhofs Ltd., Henrys Radio Ltd., and Z & I Aero Services Ltd., on their excellent service.

JIM MACINTOSH, GM3IAA

Cradlehall, Inverness.

RSGB Slow Morse Practice Transmissions

The following Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock Time		Call-sign	Mc/s	Town
Sundays				
09.30	... †	G3KZZ / G3TNF	1·920	South Shields, Co. Durham
09.30	...	G3HZL	1·940	Isleworth, Middlesex
09.45	...	G3USK	1·975	Mablethorpe, Lincs.
10.00	...	G2FXA	437·400 to North	Stockton-on-Tees
10.00	...	G3TTK	1·860	Coalville, Leices.
10.15	...	G3CGD	1·875	Cheltenham
10.30	...	G2FXA	437·400 to South	Stockton-on-Tees
10.30	...	G3SFO	1·850	Doncaster, Yorks.
10.30	...	GI3JEX	1·860	Belfast
11.00	...	G2FXA	1·900	Stockton-on-Tees
12.00	...	G3VNC	1·825	Hertford
12.00	...	GM3HBY	1·832	Glasgow
12.00	...	G3SVD	1·870	Reading, Berks.
12.00	...	G3HVI	1·890	Stoke-on-Trent
14.30	...	G3UGF	1·844	Halifax, Yorks.
20.45	...	G3IFF	1·992	Havant, Hants.
Mondays				
18.00	...	G3SWR	1·980	Middlesbro', Yorks.
18.30	...	G3NCZ	1·920	Blackburn, Lancs.
19.00	...	G3JKY	29·500	Beckenham, Kent
19.00	†	GC4LI / GC2FMV	3·600	Jersey, C.I.
19.00	...	G3NNW	433·080	Rochdale, Lancs.
19.30	...	G3VBI	1·910	Goole, Yorks.
20.00	...	G3CZA	1·975	Ely, Cambs.
20.00	...	G3USK	1·975	Mablethorpe, Lincs.
20.00	...	G3HJG	1·980	Manchester
20.00	...	G3IBJ	1·910	Southampton, Hants.
20.15	...	G3SAZ	1·845	Ashford, Middx.
20.30	...	G3TOF	1·915	Harlow, Essex
20.45	...	G3IFF	1·992	Havant, Hants.
21.30	...	G3SVD	1·870	Reading, Berks.
Tuesdays				
19.00	...	G3UPA	1·850	Sutton Coldfield, Warks.
19.00	...	G3PXX	1·875	Neston, Wirral
19.30	...	G5UF	1·970	Dorchester, Dorset
19.30	...	G3SWP	1·850	Doncaster, Yorks.
20.00	...	G3TPV	1·910	Hythe, Hants.
20.00	...	GM3UWX	3·590	Bishopton, Renfrewshire
20.30	...	G2ABC	1·915	Woodford, Essex
20·45	...	G3IFF	1·992	Havant, Hants.
22.00	...	G3HZM	1·925	Manchester
Wednesdays				
18.30	...	G2FXA	1·900	Stockton-on-Tees
19.00	...	G3NNW	433·080	Rochdale, Lancs.
19.30	...	GM3HBY	1·832	Glasgow
20.00	...	G8QU	1·970	London N22
20.00	...	G3OWA	432·520 to North	Coulsdon, Surrey
20.30	...	G3HZL	1·845	Isleworth, Middx.
20.30	...	G3KGU	1·915	Theydon Bois, Essex
20.30	...	G3SJE	1·870	Harrow, Middlesex
20.45	...	G3IFF	1·992	Havant, Hants.
21.00	...	G3HVI	1·890	Stoke-on-Trent
21.00	...	G3RIS	1·980	Cromer, Norfolk
Thursdays				
18.00	...	G3SWR	1·980	Middlesbro', Yorks.
18.30	...	G3NC	1·968	Swindon
19.00	...	G3LGK	434·326 to South-West	Ilkeston, Derbys.
19.45	...	G3LGK	434·326 to South-East	Ilkeston, Derbys.
20.30	... †	G3ROE / G3TIQ	1·915	Harlow, Essex
20.30	...	G3LGK	434·326 to North-West	Ilkeston, Derbys.
20.45	...	G3IFF	1·992	Havant, Hants.
Fridays				
18.30	...	G3NCZ	1·920	Blackburn, Lancs.
19.30	...	G5UF	1·970	Dorchester, Dorset
20.15	...	G3SAZ	1·845	Ashford, Middx.
20.30	...	G3TLF	1·915	Harlow
20.45	...	G3IFF	1·992	Havant, Hants.
21.00	...	G3RIS	1·980	Cromer, Norfolk
21.30	... †	G3UCZ / G3SUU	1·915	Pudsey, Yorks. Bradford, Yorks.
Saturdays				
10.00	...	G3TTK	1·860	Coalville, Leices.
13.00	...	G2FXA	1·900	Stockton-on-Tees
14.00	...	GI3JEX	1·860	Belfast
14·00	... †	GC4LI / GC2FMV	3.600	Jersey, C.I.
20.00	...	G3KPO	1·980	Peterborough
20.30	... †	G3TLJ / G3UXI	1·925	Roydon, Essex Harlow, Essex
20.45	...	G3IFF	1·992	Havant, Hants.

† Alternately

Channel Islands, Northern Ireland, Scotland and Wales are inadequately covered by this service to the SWL. The Honorary Organizer would be pleased to hear from any member in these areas or any other part of the British Isles, who would be willing to make regular Slow Morse Practice transmissions.

Claims for RSGB Certificates

Full conditions of the issue of the Society's awards for contacts on the h.f. bands, together with a check list, are provided in a leaflet obtainable from RSGB Headquarters. All certificate claims should be sent to Headquarters, and, after acknowledgement of receipt, these will be passed to G5GH, the Society's Honorary Certificates Manager, for checking and issue of the award.

Claims for WBC and BCRTA from non-members must be accompanied by a remittance for 7s. or the equivalent thereof. Members are reminded that WAC certificates are not issued by the Society, but that verified claims are passed to IARU HQ at Newington, USA for action.

Co-operation in connection with the conditions of issue of the various certificates will lead to reduction in the amount of avoidable correspondence and will enable the Certificates Manager to reduce any delay to a minimum.

Changing your Address?

Notice of change of address should reach the Society by the first of the preceding month.

Old Address

Name.....Call-sign .....

Address .....

..... Wrapper Mark.....

New Address

Name.....Call-sign .....

Address .....

.....

RSGB 21-28 Mc/s Telephony Contest 1966

COMMENTS from entrants in this contest reflect the success of the event, with remarks like "best I have heard for several years," "both bands in fantastic shape," "never heard so many signals from USA at one time." The good conditions are also reflected in the number of entries, the overseas being up by nearly 300 per cent on 1965. UK entries remained fairly static, being slightly higher in the single-operator section but down on the multi-operator.

The Whitworth Trophy for the leading single-operator in the contest (held on 15-16 October, 1966), goes to H. E. Perkins, G3NMH with 5487 points. To achieve this total G3NMH made 547 contacts, 76 carrying bonus points on 21 Mc/s and 62 on 28 Mc/s. Taking second place is L. Margolis, G3UML with 4479 points. G3UML was third in the home placings in 1965. First in the overseas placings goes to M. Dransfield, 5N2AAF with 2410 points, which is the highest score from abroad for some time.

A. E. White, G3HCU, having been placed second or third for the last five years in the single operator section, decided to join the ranks of the multi-operators. Here, aided by G2DVD, G3LHZ and G3UDR, he amassed 6266 points from over 700 contacts. This is over 1700 points more than the runners-up, GCHQ Amateur Radio Club, G3SSO operated by G2HDU, G3CNW, G3MSV, G3PEO, GM3UBT and G8KG.

The Metcalfe Trophy for the winner of the Receiving Section has been won by W. Moncrieff, BRS24957 who totalled 3835 points which again is a very high score. Runner-up to BRS24957 is P. J. Baxter, BRS26444 with 3305 points, closely followed by A4642 with 3235 points.

As stated earlier, conditions for the contest were very good, especially on the first day. G3HCU and his associates made 560 contacts during the Saturday starting at 07.00 and closing down at 22.45, which resolves itself as one contact each 1·6 minutes.

Many rare call-signs came to light in the contest, YA (two stations from here), HR, CR9, OA, TG, VP8 and PZ. Owing to the lack of short skip conditions on both days such prefixes as DL, OE, PA, HB9, were rarer than JA, VK and ZL. A glance at the results table will show how few entries there were from the nearer European countries.

Generally, the event was thoroughly enjoyed by all participants, perhaps with the exception of a few, who found that being restricted to use of a.m. only, was a distinct disadvantage, from those who used s.s.b.

Logs were of the usual high standard in clarity and order. There were regrettably one or two cases of bad clerical work after the event. Copying from the hastily written station log is usually the trouble here. Was it U or V?—or could it be a very rough L? Some logs from the Receiving Section still leave a little to be desired, the old problem of bonus points being sprinkled around or the inability to count them. Some entrants could help themselves for next year by reading the first two paragraphs of Rule 4 in the Receiving Contest (BULLETIN, p.330, May 1966) and being sure they understand them. However, logs of this nature were relatively few, and the majority were of the same high standard as those coming from the transmitting section.

The Contest Committee wishes to thank G3MTB, OH4OO, W6UMV and 5N2ABF for their useful and always welcome check logs.

Single-operators Section

Call-sign	Points	Position Home	Position O'seas
G3NMH	5487	1	
G3UML*	4479	2	
G3HS	4440	3	
G3PEU	2995	4	
G5HZ	2915	5	
G3JAZ	2815	6	
G2QT	2675	7	
GM5ABN/KP4BRY*	2495	8	
5N2AAF*	2410		1
G3PMX	2345	9	
G3LZQ	2275	10	
ZD8ARP*	2185		2
G3KFT	2070	11	
ZC4JU*	2040		3
UB5FG*	1995		4
ZS8L*	1920		5
9H1A*	1695		6
VS9AJC*	1510		7
ZB2AM*	1500		8
W0GTA/8F4*	1480		9
G3LNO	880	23	
I1LCK*	860		19
K5MDX*	860		19
WB2MDH*	755		21
JA6DFD*	735		22
W8QID*	727		23
W4VWU	722		24
G8DI	700	24	
9M2LO*	695		25
W9LKI*	655		26
G3DYY	650		25
G3UMV	650		25
I1LCF	575		27
UW9CE*	572		28
W0MGI*	560		29
UC2AR*	555		30
G3USF	550	27	
W5EQT/S	540		31
CT1LN*	535		32
OH0NI*	535		32
G3MWZ	525	28	
G3KSH	1470	12	
G3VJG	1465	13	
G2FUU	1445	14	
GM3RFR	1385	15	
9H1AI	1362		10
GW2HFR*	1345	16	
G2AJB	1330	17	
G3TMN	1325	18	
W4ORT*	1285		11
G3OHP	1270	19	
G3PZO	1190	20	
G3LHJ	1160	21	
G2DC	1100	22	
OH5SM*	1095		12
UP2NV*	1070		13
SP8AJK*	1035		14
W3AZD*	960		15
W3HQO	917		16
W3BYX	912		17
UR2KAA*	905		18
W6YMV*	515		34
ZL1AGO*	515		34
W5HWR/VP9*	495		36
ZS5PG*	485		37
VK4PJ*	415		38
K1YRB/2	370		39
UW3CX	305		40
W2JKH	285		41
WA2SQE	285		41
JA4FK	220		43
OZ7DX	210		44
W3CBF	210		44
K5PGS/5	185		46
YO3RF	170		47
WB6MVK	127		48
WA9FZR	125		49
DL7LV	110		50
PY2DL	70		51
PY2SD	70		51
UP2KNP	55		53

* Certificate winners

Multi-operator

Call-sign	Points	Position Home	Position O'seas
G3HCU*	6266	1	
G3SSO*	4560	2	
G3SME	3905	3	
ZC4MO*	1485		1
ZC4SS	1305		2
UB5KCA*	1115		3
GB3CRC	2920	†	

* Certificate Winners

† No operators' call-signs

Receiving Section

Posn.	Identification	Points
1	BRS24957	3835
2	BRS26444*	3305
3	A4642*	3235
4	A3254	2825
5	BRS25605	2755
6	A3724	2550
7	BRS24962	2545
8	A4038	2480
9	A2966	2305
10	BRS26003	2300
11	A4504	2255
23	BRS26407	1390
24	A5032	1275
25	A5004	1165
26	BRS26298	1115
27	BRS25429	945
27	BRS26870	945
29	A4542	890
30	BRS18461	840
31	A5010	757
32	BRS25387	680
33	A4874	630
12	A4281	2215
13	A5228	2205
14	A4152	1955
15	BRS26431	1840
16	BRS26793	1705
17	BRS26222	1690
18	BRS27592	1570
19	A4474	1540
20	A5105	1525
21	A4533	1475
22	BRS26189	1395
34	A4871	495
35	A4884	400
36	ONL1735*	375
37	WPE9HJO*	340
38	A5177	300
39	W1-12073*	215
40	BRS27525	180
41	SM5 2735*	170
42	A4772	85
43	NL.819*	45
—	—	—

CONTEST NEWS — RESULTS—REPORTS—RULES

D/F NATIONAL FINAL 1966

The National Final for Direction Finding Contests on 18 September last year started with bad weather and some of the organizers actually missing the starting site, with which they were familiar, owing to the heavy mist which surrounded and shrouded the area. However, as starting time approached, the clouds lifted, the conditions improved and arriving competitors were welcomed with little trouble. The Umpire for the event was Mr Grant from Rugby, with Mr Findlay of the RSGB Contests Committee to keep a watching brief.

The start was on Merryton Low, North Staffordshire, 1600 ft. above sea level, situated some four miles north-east of Leek and seven miles south of Buxton. Excellent views can normally be seen of Staffordshire, Cheshire and Derbyshire from this point.

When the contest was under way only one clear signal could be heard by the competitors, i.e., from the "A" station G3SMT/P. The "B" station signal was very doubtful although tests in weeks prior to this day had been satisfactory. The umpires therefore decided that a bearing on the "B" station should be given. The bearing announced was later found to be very accurate, passing through the site of the station, much to the surprise of the organizer, who had made a rough guess.

The "A" station was established in a cave (NGR 102570) on an escarpment some 4½ miles south-east of the start. The equipment was a Codar AT5 transmitter feeding a Joystick aerial propped up in the cave. Unfortunately the operators encountered some difficulty when, on testing prior to the next transmission at 14.00, the transmitter was found to be suffering from a lack of h.t. owing to a faulty battery. After what was described as a mad scramble downhill and uphill by the two operators, a further battery was acquired and the scheduled transmission commenced some two minutes late. This delay caused some problems among certain of the competitors and for this apologies were extended later. It appears that Mr Grant enjoyed his inspection visit to this station as it took him considerable time to locate it owing to his efforts at avoiding the competitors. Reception of signals from this station, when monitored at the starting point, remained constant for the period of the contest and on time for the remaining agreed schedule. The first competitor to arrive there was Mr Hoffman, followed by Mr Hawkins nine minutes later and closely followed by Messrs Bristow and Mollart. Twelve competitors found this station.

The "B" station, G3HMF/P, was located approximately 12 miles north-east, NGR 171736, in some woods. Owing to the inclement weather the aerial was moved just before the contest started in order to try and clear the overhead foliage, and assist the radiation of the signal. This move was apparently a bad one, for not only did it give a poor signal at the commencement of the contest, but it was also visible to the more eagle-eyed competitors as they approached along the track leading to the site. It is interesting to note that the monitoring station heard signals of good strength at 14.00 from this station, but silence thereafter. Reports from competitors were that signals were variable, which must be attributable to the hilly terrain and the conditions. The first arrival was Mr Mollart at 14.17 followed by Mr Hitchcock and Mr Bratton some 20 minutes later. Eight of the contestants found this station.

Afternoon tea at the Dog and Partridge Hotel, Thorpe, was enjoyed by some 60 people, including Regional Representative Mr F. Ward, G2CVV, in whose area, Region 4, the contest was held. At the final adjudication seven teams had found both the stations and book token prizes were presented to the winners and runners-up by the South Manchester Radio Club Honorary Secretary and Organizer Mr M. Barnsley, G3HZM. During the discussion which always follows such events, much constructive criticism was made. The overall opinion, however, was that it had been a successful event. Mr Findlay expressed a vote of thanks to the organizers on behalf of the RSGB Contests Committee and to Mr Grant for attending and acting as Umpire. Mr Barnsley, G3HZM, and Mr W. M. Furness, G3SMM, Chairman of the South Manchester Radio Club, also wished to put on record their thanks to Messrs J. A. Elliot, G3KIQ, G. G. Kenyon, G3HMF, P. G. Torry, G3SMT, R. N. Barker, G3UTL, C. Walker, G3USO, and W. Shaw, G3SHW for their assistance with equipment, operating and organizing.

RESULTS

Position	Competitor	Club	Time of Arrival A Station	Time of Arrival B Station
1	E. L. Mollart	Oxford	15.01	14.17
2	A. Hitchcock	Derby	15.30	14.40
3	W. J. North	Chiltern	15.41	14.46
4	V. F. Bratton	Oxford & District	15.42	14.40
5	G. H. Taylor	Rugby	15.52	14.47
6	E. W. Bristow	Oxford	15.00	15.59
7	D. Roome	Derby	16.28	15.21
8	R. T. Hoffman	Rugby	14.39	—
9	M. P. Hawkins	Oxford	14.48	—
10	P. M. Williams	Slade	15.20	—
11	C. N. Smart	Slade	15.21	—
12	I. R. Butson	Oxford & District	—	15.48
13	G. T. Peck	High Wycombe	16.30	—

CONTESTS DIARY

1-31 March	—Canadian Centennial Year Contest (see page 41, January, 1967)
4-5 March	—ARRL DX Contest (Phone)
4-5 March	—Second 144 Mc/s Contest (Open)* and 144 Mc/s Listeners' Contest. (See page 52, January, 1967)
4-6 March	—BARTG Spring RTTY Contest (see page 90, February, 1967)
11-12 March	—BERU (see page 838, December, 1966).
18-19 March	—ARRL DX Contest (C.W.)
1-2 April	—SP DX C.W. Contest
2 April	—Low Power Contest (3·5 Mc/s) (see page 115, February, 1967)
8-9 April	—CQ WW S.S.B. Contest (see page 167)
15-16 April	—Second 70 Mc/s Contest (Open)* and 70 Mc/s Listeners' Contest* (see page 111, February, 1967)
23 April	—D/F Qualifying Event
1 May	—D/F Qualifying Event
6-7 May	—USSR Contest (see page 166)
7 May	—Third 144 Mc/s Contest (Portable)* (see page 189)
20-21 May	—First 1296 Mc/s Contest (Open)* (see page 190)
20-21 May	—YL Int. S.S.B. Contest
27-28 May	—First 432 Mc/s Contest (Open)* (see page 189)
3-4 June	—National Field Day (See page 50, January, 1967)
18 June	—D/F Qualifying Event
2 July	—Fourth 144 Mc/s Contest (Portable)*
8-9 July	—1·8 Mc/s Summer Contest
16 July	—D/F Qualifying Event
23 July	—Third 70 Mc/s Contest (Portable)*
30 July	—D/F Qualifying Event
2-3 September	—V.H.F. NFD/IARU Contest* (see page 108, February, 1967)
10 September	—80 Metre Field Day
17 September	—D/F National Final
7-8 October	—Second 1296 Mc/s Contest (Open)*
14-15 October	—RSGB 21-28 Mc/s Telephony Contest
14-15 October	—Second 432 Mc/s Contest (Open)*
28-29 October	—RSGB 7 Mc/s DX Contest (Phone)
11-12 November	—RSGB 7 Mc/s DX Contest (C.W.)
18-19 November	—Second Top Band Contest
3 December	—Fourth 70 Mc/s Contest (C.W.)*

* Qualifying contests for V.H.F./U.H.F. Listeners' Championship.

SECOND 1·8 Mc/s CONTEST, 1966

The second 1·8 Mc/s contest held on 19-20 November, 1966, was won with a very clear lead by C. Whelan, GW3NJW. Operating from an alternative address near Newport, Monmouth, he led both the points and QSO tables.

In second place was G3SSO, operated by E. A. Fowles, G3PEO. With 611 points from 132 contacts, he was 88 points behind the leader. A further 12 points down was Mike Whitaker, G3IGW, in third place.

The leading Scottish station was Tom Heslop, GM3KMR, in sixth position.

Band Conditions

Conditions were generally good, particularly after midnight when the longer distance contacts within the UK were easier to make. Foreign stations appearing in logs were W1HGT, VO1FB, OH3NY, PA0, EI and many OKs. VP1DX and a W0 were also reported to have been active.

As ever, a half wave aerial of some kind seems to be an essential ingredient for success in this contest and all leaders used these.

Competitors

GW3NJW used a KW2000 transceiver, and G3SSO also used a KW2000 but with a Collins 51-S1 receiver. G3IGW used a home-built transmitter with a 5763 p.a. and an Eddystone S750 receiver.

GM3KHH would like to see the contest scored on a points per mile basis, and calculated that his score would have been 48,986!

GM3SVK found the contest hard going from Unst in the Shetland Isles. Although many of the southern stations were 599 throughout the contest he could not make many contacts until later when stations began listening for weaker signals.

G4VF and A. A. Goecher, A3942 are thanked for their useful check logs.

Posn.	Call-sign	County Code	No. QSOs	Total points
1	GW3NJW	MH	151	699
2	G3SSO	GR	132	611
3	G3IGW	YS	141	599
4	G3NKS/A	SY	138	583
5	G3PWU	BE	136	559
6	GM3KMR	MN	116	556
7	G3RVM	NR	134	543
8	GM3KHH	BF	110	539
9	G3BIK	ND	109	524
10	G3RXO	BD	109	520
11	G5RP	BE	110	512
12	G3SVW/A	LE	112	507
	G3KMI	HE	109	507
14	GM2HCZ	DF	101	493
15	G3TAA	LD	112	465
16	GW3CW	DB	98	460
17	G3TIR	SX	103	459
18	G3TEL	BE	99	450
19	G3UGX	LE	93	439
20	G6HD	KT	101	432
21	G3TLH/A	YS	96	426
22	GM3FXM	FE	87	429
23	GM3SVK	SL	85	423
24	G3TMC	LN	91	419
25	GW3GWX	CV	89	416
26	GM3OXX	MN	83	397
27	GM3PFQ	FE	80	396
28	G3LAI	CH	84	378
29	G3IGZ	LD	92	369
30	G3VFD	KT	91	362
31	G3VMQ	SX	82	361
32	G3VES	BD	70	340
33	G3ULO	EX	83	329
34	G3HZL	MX	78	325
35	G3UQL	EX	72	310
36	GM3LHV	MN	65	303
37	GW3HGL	DB	67	294
38	G3JVJ	SX	65	291
39	G3UJX	CH	68	290
40	G3JFY	HE	54	244
41	G3RQI	BS	55	238
42	GM3ORX	DU	45	223
43	G3ABM	CH	50	205
	G2HDR	GR	43	205
45	G3AKF	DT	40	198
46	G3JKY	KT	41	162
47	G3TPJ	EX	55	127
48	G6OO	LN	23	109
49	G3KSH	MX	28	102
*	G3UEG	NM	125	599

* Entry unacceptable. Multi-operator station.

Third 144 Mc/s Contest (Portable) 1967

Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship.

1. **When:** 10.00 GMT to 18.00 GMT on **Sunday, 7 May, 1967.**
2. The **General Rules** for RSGB contests published in the January 1967 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Power supplies.** Power for any part of the station shall not be derived from supply mains, and the input to any stage of the transmitter shall not exceed 25 watts.
4. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence except A2 (m.c.w.).
5. **Scoring** will be on the basis of one point per kilometre for contacts with fixed stations and two points per kilometre with portable or mobile stations.
6. **Contest Exchanges.** (*a*) RST or RS reports followed by serial number. (*b*) Location Information. QRA locators are required on the Logs for the purposes of scoring. However, contestants are reminded that they may exchange any other type of location information if they wish.
7. **Entries** (i) should be submitted on RSGB Contest Log Sheets, obtainable from RSGB Headquarters.
   (ii) Logs should be tabulated in columns as follows: (*a*) Date and Time (GMT), (*b*) Call-sign of station worked, (*c*) My report on his signals and serial number sent, (*d*) His report on my signals and serial number received, (*e*) QRA locator received, (*f*) Call-sign of operator (Multi-operator entries only), (*g*) Distance in kilometres, (*h*) Points claimed.
   (iii) The Cover Sheet must be made out in accordance with the general rules.
   (iv) Entries must be post-marked not later than **22 May, 1967.**
8. At the discretion of the Council a miniature cup will be awarded to the winner and a Certificate of Merit to the runner-up.

First 432 Mc/s Contest 1967

As stations in this contest can work from more than one location they have the advantage of claiming the score for the best contact with any particular station. This applies equally to static stations who may work them at more than one site. Please note that the section 432 to 434 Mc/s is to be used and that distances are to be measured in kilometres.

Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship.

1. **When:** 18.00 GMT on **Saturday, 27 May,** to 18.00 GMT on **Sunday 28 May, 1967.**
2. The **General Rules** for RSGB contests published in the January 1967 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Stations** may operate from more than one site.
4. **Contacts** may be made on any mode permitted in the entrant's Amateur (Sound) Licence except A2 (m.c.w.) on frequencies between 432 and 434 Mc/s.
5. Scoring will be on the basis of one point per kilometre.
6. **Contest Exchanges** (*a*) RST or RS reports followed by serial number. (*b*) Location Information: QRA locators or a distance and bearing from a town identifiable without ambiguity on the Ordnance Survey "Ten-mile" map.
7. **Entries** (i) Should be submitted on RSGB Contest Log Sheets obtainable from HQ.
   (ii) Logs should be tabulated in columns as follows: (*a*) Date and Time (GMT); (*b*) Call-sign of station worked; (*c*) My report on his signals and serial number sent; (*d*) His report on my signals and serial number received; (*e*) QRA locator of station received, or (*e* and *f*) "Ten-mile" map

(*Continued on page 190*)

locations, if used; (*g*) Call-sign of operator (multi-operator entries only); (*h*) Points claimed. Logs must show when the location is changed and the new location information. Contacts with stations operating from two locations or contacts made from different locations with a particular station should be clearly marked, and points claimed for the best contact.

(iii) The cover sheet must be made out in accordance with the General Rules and the declaration signed. Multi-operator entries should be so marked and the operators listed.

(iv) Entries must be post-marked not later than **Monday, 12 June, 1967.**

8. Awards. At the discretion of Council three awards will be made; to the leading fixed station, the leading portable or /A station and the runner-up. The overall winner will receive a miniature cup and the other two stations a Certificate of Merit each.

First 1296 Mc/s Contest 1967

Cross-band contacts either way are permitted, scoring half-points. Distances are to be measured in kilometres and the section 1296 to 1298 Mc/s is to be used.

Check logs from listeners are invited and may be credited towards the V.H.F. Listeners' Championship.

1. When: 18.00 GMT on **Saturday, 20 May** to 18.00 GMT on **Sunday, 21 May, 1967.**

2. The **General Rules** for RSGB contests published in the January 1967 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.

3. Contacts may be made on any mode permitted in the entrant's Amateur (Sound) Licence on frequencies between 1296 and 1298 Mc/s.

4. Scoring will be on the basis of 2 points per kilometre for stations on the 1296 Mc/s band and 1 point per kilometre where one station is in the 432 Mc/s band.

5. Contest Exchanges (a) RST or RS reports followed by serial number.

(b) Location information: QRA locators or a distance and bearing from a town identifiable without ambiguity on the Ordnance Survey "Ten-mile" map.

6. Entries (i) should be submitted on RSGB Contest Log Sheets, obtainable from HQ.

(ii) Logs should be tabulated in columns as follows: (a) Date and time (GMT); (*b*) call-sign of station worked; (*c*) My report on his signals and serial number sent; (*d*) His report on my signals and serial number received; (*e*) QRA locator of station received, or (*e* and *f*) "Ten-mile" map locations, if used; (*g*) Call-sign of operator (multi-operator entries only); (*h*) Points claimed. Cross band contacts should be marked "CB" in the points-claimed column.

(iii) The cover sheet must be made out in accordance with the General Rules and the declaration signed. Multi-operator entries should be so marked and the operators listed.

(iv) Entries should arrive at RSGB Headquarters not later than 14 days following the contest.

7. Awards: At the discretion of the Council a miniature cup will be awarded to the winner and Certificates of Merit to the runner-up and the non-transmitting member submitting the best check log.

Grafton Top Band Contest

The rules of the annual G2AAN Top Band Contest organized by the Grafton Radio Society are as follows :

When: C.W., 1 April, 1967. Phone: 8 April,1967. 22.30 BST until 01.00 BST (i.e., 21.30 GMT until Midnight GMT) on both dates.

Procedure and Scoring: Competing stations should call "CQ GRS" on C.W. and "CQ Grafton Contest" on phone. Competitors should exchange RST (or RS) reports followed by a serial number commencing with any number between 001 and 100, increasing by 1 for each contact. Serial numbers for the two sections should *continue consecutively*. RST and serial numbers *must be acknowledged*.

Each contact will count for 1 point, any station being worked *once* only in *each* section. First and second place certificates will be awarded to the stations achieving the two highest *total* scores, and further certificates will be awarded to the individual winners of each section.

Logs, bearing the usual signed declaration, should be sent to G3SIL, 29 Pangbourne Drive, Stanmore, Middlesex, to arrive not later than 17 April (blank Log sheets and detailed copies of the Contest Rules are available from G3SIL on receipt of an s.a.e.).

Radio Amateur Emergency Network News

By S. W. LAW, G3PAZ*

Provocation

NO doubt everyone knows the story of the little man who felt out in the cold, so made faces at the drivers and firemen of passing steam trains—and was pelted with coal. He had a warm time! Then there was the other little man whose premises were opposite a brickyard—he made provocative remarks and was pelted with bricks. Later this little man was able to build a grand edifice; the pride of the district! What has all this got to do with RAEN? (Thinks!).

There's no pint in it!

Don't stand around at the "local," pint in indignant fist fulminating about Raynet, but let's have those brickbats right away. Then, perhaps, like the little man above, we can not only build this in to the sort of column *you* want, but we can really iron out all our minor troubles and make Raynet a really vital factor in our very hazardous existence.

Good resolutions

Why not take a hard look at that gear and make certain that it will work when you want it—in a hurry! And may we never need to turn out in 1967.

More on "Four"

South Essex is understood to be growing active on 4m, and any reports from stations in or out of the area will be of the greatest assistance in setting up and determining the coverage. Have a look round 70·375 sometime; and tell G3OVX.

What's this 'ere?

Heard in a Raynet Rally contest: "Who's that keeps on breaking in Old Man?"

"G3XYZ. I don't think he's a Raynet station." So they went on nattering. It *was* a Raynet station—in another county. So they lost quite a few points and upset the other fellow. Was it you chaps?

Co-operation

Have you taken steps to ensure the willing co-operation of your employer in the event of a genuine emergency? Not—*please* not—any exercise that crops up on a nice sunny day, but the real thing (and don't think it cannot happen in your area). A quiet, reasonable explanation coupled with the assurance that no frivolous advantage will be taken of the privilege should convince any reasonable employer of your sincerity. Also you will be brought to his notice as a responsible type. What about it?

Stirring

No! Not that kind, but a friendly comment on a stirring of activity in the Lincoln area; let us hear more about this. Also moving is Kent; particularly the Orpington area. Will those in this area please contact G3BPT (P. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent) who will be only too pleased to assist. Then there is a nucleus of interest in the Weston-Super-Mare district. This should be a very useful development, bearing in mind the terrain in this part of the country. As to the best bands for coverage, this can safely be left in the capable hands of the locals who are only too well aware of the snags.

Welcome

News of new members is always of interest. Amongst these we notice G3VOG of Shoreham-by-Sea, Sussex, who has evidently climbed on the band waggon (?) at the first opportunity. Then, at the other end of the scale as it were, there is that stormy petrel of the air G6QN. What a signal on 70·365! There can be no loss of coverage in North-East Surrey on that frequency. Welcome, Old Timer!

Registration

Are you sure you sent your card in for stamping? If not, take a look right now. John Denny is still available, although he will be otherwise engaged after April. Anent this, G2ABC (who is, by the way, doing a great job in connection with one of the most famous charitable institutions in the country) has very kindly offered through G4VF to act as Honorary Registration Secretary from April, 1967. No other offers have yet been received.

Central Meeting

The Surrey Group has settled on a cosy and well-appointed meeting place due to the efforts of a Haslemere member. The venue is situated near the centre of the county at West Horsely where the members meet each month to sort out problems of coverage, mods. to gear and so forth, and to hear talks from various knowledgeable people on such topics as bear upon emergency communications. Practice is not neglected (have you noticed *who* gets lost in unfamiliar country?). Listen on 70·365 Mc/s for this group.

RAEN Committee

The Committee met at the RSGB Headquarters on Saturday, 21 January. Present were the Honorary Chairman, G3ION, the Honorary Secretary, Mr E. R. L. Bassett, G3IIR, G4VF, G3BPT, and G3PAZ. Apologies for absence were received from G2UK and G3VK. A solid session was spent, broken only by the lunch period and the inevitable tea and cake. The meeting dispersed at 17.00. Great satisfaction was expressed at the increasing amount of interest shown by correspondence from a number of locations in Great Britain on matters appertaining to RAEN, of which more in a later column.

Resignation

We are sorry to hear of the resignation of GI3HXH as Area Controller, Londonderry. Our thanks are due for his efforts in the past in this area.

New Appointment

The post of IAC in Herts. has been taken over by G3NRB.

Read your licence

Certain letters to the committee have dealt with the matter of participation in a greater range of activities than those for which we are covered. To make this clear, a "disaster" is that which cannot be reasonably foreseen. On the other hand, if the risks involved in a given activity are accepted by the participants (and this includes spectators) any mishap is classed as a "covenanted (foreseen) disaster" and any participation is *not valid*. So if you are asked to assist in any organized event in your capacity as a member of RAEN it is as well to politely decline.

(Continued on page 195)

* 11 Chisholm Road, Croydon, Surrey.

News from Headquarters

Mr. Rouse, G2AHL, General Manager of the Society and Editor of the BULLETIN, is making a good recovery from his recent illness and has asked us to pass on his thanks to all those members of RSGB, Groups and Affiliated Societies who have been kind enough to send him " get-well " cards and other messages of cheer.

New Italian Licensing Regulations

Long-awaited new Italian amateur licensing regulations came into force on 18 January, 1967. Most of the changes are favourable but one is retrograde. Additionally two old problems remain unsolved. On the credit side a simplified procedure for obtaining a licence has been introduced, the Morse code examination requirement has been reduced to 40 characters a minute for all three classes of licence, the age limit for obtaining a licence has been reduced from 18 to 16 years, the validity of licences has been increased to five years and input power allowed to holders of the First Class licence has been increased from 50 to 75 watts. When the need arises amateur stations will be authorized by the Ministry of Posts and Telecommunications to handle emergency communications.

On the debit side operation on frequencies between 146 Mc/s and 21,000 Mc/s is no longer authorised but as the new Act gives to the Ministry power to modify the allocation of frequencies it is hoped that a few channels in the 432 Mc/s band will be allocated to Italian amateurs. The previous limitation of two narrow channels, totalling 34 kc/s, in the band 3·5-3·8 Mc/s is to continue.

To the great disappointment of many Italian amateurs the new regulations make no provision for a mobile licence, neither do they permit a licence to be issued to foreigners. However, foreign amateurs can obtain an operators' licence which authorizes operation from the station of any licensed Italian amateur.

Reciprocity

New reciprocal operating agreements during 1966 brought to 21 the number of countries granting privileges to US amateurs.

World Administrative Radio Conference

A World Administrative Radio Conference to deal with matters relating to the maritime mobile service is to be held in Geneva from 18 September to 4 November, 1967. In preparation for this Conference, which is not expected to affect the amateur service, it was decided at the CCIR XIth Plenary Assembly in Oslo, last year, that a Special Meeting of Study Group XIII (Mobile Systems) should be held to prepare the technical basis for the Conference. The Special Meeting will be held in Geneva during April, 1967.

Radio Amateurs' Examination

The cost for the Syllabus pamphlet No. 55 mentioned in the RSGB *Radio Amateurs' Examination Manual* is no longer 1s. The current price is 1s. 6d.

" The Discovery of Television "

The Mullard film entitled " The Discovery of Television," which was transmitted by the BBC on the 30th anniversary of the opening of the British television service, is now available on loan to radio clubs and other organizations. Application should be made to Mullard Ltd., Torrington Place, London, WC1.

GPO " No " to Citizens' Band

Despite persistent rumours to the contrary the GPO have officially denied that they are considering opening a " Citizens' Band " in the United Kingdom. The Post Office contend that 27 Mc/s licences covering the use of speech cannot be granted as " this band is set aside for industrial, scientific and medical equipment and is also used for a variety of low-power signalling systems." The Post Office claim that they are profiting by the experience of other countries such as the United States, who have allocated frequency space for this purpose " but now regret it." Poor frequency stability and harmonics could lead to chaos. High technical standards would raise prices and defeat its purpose.

Amateur Licences

On 31 January, 1967, the number of amateur licences in force in the United Kingdom was as follows:

Amateur (Sound) Licences A:	12,055
Amateur (Sound) Licences B:	517
Amateur (Sound Mobile) Licences A:	2,194
Amateur (Sound Mobile) Licences B:	9
Amateur (Television) Licences:	176

There were also 10,463 model control licences in force.

Pirate Fined

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following conviction has recently been obtained.

On 29 December, 1966 at Wallington, Surrey, Magistrate's Court, a Mr Royston Kenneth Watkins of 17 Birdhurst Road, London, SW19, was convicted of two charges of using wireless telegraphy transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949. He was fined £10 on each of the charges and ordered to pay £8 8s. costs.

Use of A2 in RSGB Contests

The A2 mode, i.e., modulated c.w., is not permitted in RSGB contests because widespread use of this type of transmission would cause unnecessary interference on adjacent channels, especially if transmitters were inadvertently over-modulated or modulated with distorted audio frequency waveforms. On v.h.f. the A1 mode of telegraphy is more suitable for long distance working owing to the narrow bandwidth which may be employed in the receiver, resulting in an improved signal-to-noise ratio.

RSGB Dinner Club

The next meeting of the Club will be held on Friday, 7 April at 7.30 p.m. for 8 p.m. at the Kingsley Hotel, Bloomsbury Way, London, WC1. The proceedings are completely informal and an invitation is extended to all members. The cost is 25s. per person and reservations accompanied by the remittance may be made to Society Headquarters.

Postal Orders

A member recently sent a letter to Headquarters containing a postal order. The letter was not received and eventually the GPO reported that the order had been cashed in the London Postal Region. However as the name of the payee had not been filled in before despatch our member could not obtain any compensation. *Moral:* always fill in the name of the payee and cross any postal order sent to Headquarters.

Affiliated Societies

The following societies are now affiliated to RSGB.

NATIONAL RADIO CLUB:
F. Borg, 35 St. Anthony Street, Balzan, Malta, G.C.

LOWLAND ROYAL SIGNALS AMATEUR RADIO CLUB:
2/Lt. A. T. Grant, Lowland Royal Signals Amateur Radio Club, 21 Jardine Street, Glasgow, NW.

THE JUNIOR LEADERS' REGIMENT ROYAL ENGINEERS' RADIO CLUB:
A. Stockings, The Junior Leaders' Regiment, Royal Engineers' Radio Club, Old Park Barracks, Dover, Kent.

GLASGOW UNIVERSITY RADIO CLUB:
P. G. Bower, GM3OFT, Glasgow University Radio Club, Department of Electrical Engineering, The University, Glasgow, W2.

THE UNIVERSITY OF KENT AT CANTERBURY RADIO CLUB:
P. S. Nicholson, G3VJF, Rutherford College, The University, Canterbury, Kent.

GREENOCK AND DISTRICT AMATEUR RADIO CLUB:
R. Holt, GM3VCD, 13 Royal Street, Gourock, Renfrewshire, Scotland.

" 73 " S.S.B. SOCIETY:
E. S. Ellis, G3LSF, Hon. Secretary, 73 Avondale Road North, Southport, Lancs.

WESTON-SUPER-MARE RADIO SOCIETY:
A. E. Seymour, MBE., G3GNS, Manor Farm, Hill End, Banwell, Weston-super-Mare.

NEWNHAM RADIO & ELECTRONIC SOCIETY:
S. Cakebread, G3IDI, 20 Lloyd Road, East Ham, London, E6.

The address for the City & Guilds College Radio Society, published the 1967 RSGB *Amateur Radio Call Book*, was incorrect. It should be: c/o D. F. Hardman, Electrical Engineering Dept., City & Guilds College, Exhibition Road, London SW7.

Can You Help?

● I. G. Mant, G8AVJ, 28 Welbourne Road, Childwall, Liverpool 16, who wishes to borrow manuals for an ex-RAF indicator Type 6, a transmitter-receiver Type TR-3699, a signal generator Type 101 and a USAF test set TS-32/TRC-1?

● L. Telford, BRS28142, 4 Ledbergh Road, North Shields, Northumberland who requires information on the Receiver Type 88 or R1475?

Silent Keys

We record with sorrow the passing of the following amateurs:

F. King, G5MF, of Thundersley, Essex.

J. Dowding, GC8DO, of St. Peter Port, Guernsey, C.I.

Group Capt. C. A. H. Gaudie, G8VC, of North Weald, Essex.

Obituaries

R. G. WYATT, G3HFJ

We deeply regret to record the passing on 6 January, 1967, after a protracted illness, of R. G. " Bob " Wyatt, G3HFJ, of Wokingham, Berkshire.

Bob was a " Ham " to the bone, a member of the Tops Club, a Chief of Tennessee Valley Indians and a DX enthusiast.

Bob will be deeply missed by his many friends and to his wife, son and family we express our deepest sympathy.

G.R., A.G.G.

Obituaries

C. J. BAYES

It is with profound regret that we report the sudden death of a long standing member, Mr Charles John Bayes, G2JS, at the age of 66.

Charles was admitted to Hospital to undergo a major operation on 21 November and was making satisfactory progress until the evening of 6 December when he suffered a heart attack from which he did not recover.

G2 Jolly Sailors, as he was known, joined the RSGB in the 1920's and has been a member ever since maintaining a very active interest up to the commencement of hostilities.

He was especially well known on the 7 and 14 Mc/s bands when he operated virtually round the clock. Whatever the conditions on the band Charles was always in evidence, in fact much of his DX was worked as a result of calling when the band was " dead."

During the war Charles volunteered his services on radio interception watch and gave the utmost time and assistance until hostilities ceased. It is very sad to relate that the burden of this extra work on top of his business activities resulted in his contracting tuberculosis necessitating medical treatment for a year and compelling him to retire from work at the very early age of 48, spending most of the next few years in bed.

Although he was now compelled to live a very disciplined life, he still maintained an active interest in amateur radio, operating on both 7 and 14 Mc/s.

Many amateurs who have worked him have evidence of his amazing ability to improvise events using an aerial wrapped around his bed.

Charles is already sadly missed by all who knew him. He was in every sense a credit to the Radio Amateur movement and a " Ham."

W. C. E. BLACKMORE, G3HRA

It is with extreme sadness that we learn of the passing of W. C. E. Blackmore, G3HRA. Bill as he was known over the air was active mostly on 20 metres c.w. He was in business for many years as an old established Radio Retailer who was always ready to give a helping hand to the young amateur. He leaves a widow and three sons; the eldest Kenneth Blackmore lives in America. The business will be carried on by his youngest son Bill Blackmore, Jnr.

Our sympathies are extended to his family for their loss.

R.B.

M. G. JONES, GW3JLI

The death occurred on 6 October, at the early age of 43 years, of Myrddyn Goronwy Jones, GW3JLI.

Myrddyn's interest in amateur radio developed during the period immediately following the end of the war. Being sightless almost from birth he relied to a great extent upon the assistance given by local amateurs, and in this respect the help and facilities provided by GW3CYB were widely appreciated.

He operated solely on 80m and could be heard most evenings. His encouragement to newcomers, his cheery laughter, and the characteristic " Oh Aye " and " Good evening gentlemen " were well known features at the top end of the band.

Many knew Myrddyn over the air, fewer had the pleasure of meeting him, fewer still knew him as closely as G3PHN, but all respected and admired the manner in which he overcame his disability and operated his station.

He was a small man with a big heart and was a friend to all who knew him.

Amateur radio is much the poorer by his passing.

S.B.L.

R. A. HAWLEY, G3OOA

Amateur Radio lost a loyal and devoted enthusiast with the sudden passing of R. A. Hawley, G3OOA, on 1 January, 1967.

A keen supporter of RSGB and RAIBC, Ray's cheery voice will be missed from the h.f. bands, particularly by his RAIBC friends. Best known for his Northern homeliness, fondness of people, superb knowledge of geography, Ray's ever open door and ever boiling kettle are alas gone for ever.

A.J.H.

J. PEARSON, G3PTP

James Pearson, G3PTP, passed away on 8 January after a short illness. He was employed as a draughtsman by a local television company and was a regular member of the Spen Valley Amateur Radio Society. G3PTP was keenly interested in mobile operation on 70 Mc/s and 144 Mc/s and will be missed by all who knew him.

N.P.

Appointment of RSGB Press and Publicity Officer

The increase in the number of people concerned in Amateur Radio, the widening of the scope of the hobby and the significant growing sophistication in its social activity has resulted in extra pressure on the Society's already overburdened Headquarters staff and facilities. Thus, to delegate a member of the staff to answer written and telephoned queries from the Press, as in the recent " Dartmoor " incident, to cope with special occasions, like the Duke of Edinburgh's visit to the Communications Exhibition, and with well-meaning enquiries and visits from large numbers of visitors to London, is to aggravate an already very difficult situation.

The Council realized that a specialist was needed to handle these affairs, but commercial public relations services are very expensive indeed and an " outsider " would find it difficult to understand the essentially esoteric quality of Amateur Radio, which would be necessary before he could interpret the hobby to the public. The employment of professional consultants at this stage, too, would be inadvisable, because nobody has any idea of what such a job should involve, nor how far its terms of reference should extend.

I have therefore agreed to act as Press and Publicity Officer for one year, from 1 February, 1967, on an honorary basis. This will be a trial year and one of experiment, while the Council and I attempt to work out what the scope of the project should be.

Obviously, with regard to the Press, the main and urgent task will be to act swiftly and decisively on each of the many occasions that damaging and untrue statements regarding Amateur Radio appear in newspapers. To do this it will be necessary to attempt to arrive at some sort of understanding and friendly relationship with the Press.

At the same time it is proposed that general enquiries directed to Headquarters should be filtered through to me wherever possible. Many of these enquiries are non-technical and those from visitors to Britain would in any case come under the terms of reference of the RSGB Welcome to London Scheme, in which I am already involved.

I would like, too, to work out a system whereby the true facts about Amateur Radio can be made easily available to schools, colleges and youth clubs and, perhaps, for speakers to go to Rotary, Women's Institute, Community Centres and Friendship Club meetings, to talk about Amateur Radio. I have been doing this myself, with gratifying success, for some years and I am certain there are many other people connected with Amateur Radio who are capable of such public speaking and willing to do it in their own areas.

Obviously it is essential that expenses in this project should be kept to an absolute minimum. As far as we can see these should cover little more than postage, telephone calls and occasional short journey fares. All expenses will be scrupulously noted, so that, at the end of the year, the Council, and the membership, can judge how much has been achieved, at what cost, and whether the achievement has been worth the cost.

One year might possibly prove the job too much for a voluntary worker. In this event, at the end of the year, the Council can decide whether it would be worth employing professional public relations consultants to continue the task on the basis laid down during the trial year.

I shall work in the closest collaboration with Headquarters staff and the Officers of the Society and would be reluctant to make an important decision without their advice and support, particularly with regard to the Press. But I shall need collaboration from the members, too. Their experience, help and advice are essential if this scheme is to be useful and worthwhile.

I would be grateful to receive from members newspaper cuttings regarding Amateur Radio, particularly from local papers or from publications which might not be generally available. If the excerpt is damaging, as many details as possible of the true facts concerning the incident should be included, together with the circumstances which gave rise to the publication of the item. Accounts of local " public relations " efforts would also be useful.

Correspondence should be sent to me at 95 Collinwood Gardens, Clayhall, Ilford, Essex. My telephone number is 01-550 0882. If correspondence is to be sent first to Headquarters, it should be clearly marked " Public Relations Officer."

SYLVIA MARGOLIS

Mullard Meetings

Film meetings arranged by Mullard Limited will be held during March on the following dates: 9th, Bournemouth (Wessex Hotel), 14th, Jersey (Pomme d'Or Hotel); 15th, Guernsey (Hermitage Hotel); 21st, Redruth (Cornwall Technical College); 22nd, Plymouth (Continental Hotel).

All meetings commence at 7.45 p.m. and the programme consists of a talk on " Transistors and Television " followed by a showing of the new Mullard Film " Electronics in Harness."

RSGB members are cordially invited to attend these meetings but to assist the organizers a postcard should be sent in advance to Mr Ian Nicholson, Films & Lectures Organization, Mullard House, Torrington Place, London, WC1. Refreshments will be served during each meeting.

Can You Help?

● S. Uren, A5207, 22 First Avenue, Wickford, Essex, who wishes to borrow a Handbook for the Marconi CR150/2 receiver?

● T. H. Bartlett, G3ITB, 19 Manor Road, East Grinstead, Sussex, and J. P. Ceresole, BRS28102, 58 Nevern Square, London, SW5, who wish to obtain the Service manual on the DST 100 receiver?

Merseyside Lecture

An audience of some 90 members listened enthralled whilst Mr Peter Jones, G2JT, delivered his lecture in Liverpool on 25 January. His topic was " Aerial Power Tactics " and he proved his points by measuring the radiation from the various aerials exhibited.

An unusually large number of questions showed how interested were the audience and further enlightened discussions followed.

Mr Ken Birch, G2FOS, proposed the vote of thanks and said how grateful were the members of Region 1 to Mr Jones for such an enjoyable and instructive evening.

G2AMV

RSGB Amateur Radio Call Book

The following are corrections to the 1967 edition of the RSGB *Amateur Radio Call Book*.

G6LD, I. C. I. Lamb, The Hirsel, Jumble Wood, Fenay Bridge, Huddersfield, Yorks.

G3LJA, M. J. Heathcote, 35 The Bowls, Vicarage Lane, Chigwell, Essex.

G3GMY, F. E. A. Green, 48 Borough Way, Potters Bar, Herts.

G2YT, C. C. Redshaw, C.Eng., Manor Cottage, Buckland Ripers, Weymouth, Dorset.

Society Affairs

THE meeting was held on Monday, 16 January, 1967, and was attended by the President (Mr A. D. Patterson in the Chair), Messrs N. Caws, J. Etherington, J. C. Foster, J. C. Graham, L. E. Newnham, F. K. Parker, J. F. Shepherd, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, G. Twist, E. W. Yeomanson (Members of the Council) and Mr J. A. Rouse (General Manager and Secretary), Mr D. W. Robinson (Assistant to the General Manager) and Mr H. J. Hallen (Headquarters staff).

Welcome to New Members. The President extended a welcome to Messrs L. E. Newnham and E. W. Yeomanson upon their re-election to Council.

Election of Executive Vice-President. Mr J. C. Graham, G3TR, was elected to the office of Executive Vice-President for the ensuing year.

Apologies for Absence were submitted on behalf of Messrs B. Armstrong and E. Ingram and also from Mr L. N. Goldsbrough after the meeting.

Recommendations of Committees

The Council accepted recommendations relating to the offer of Sheffield University Amateur Radio Society to set up a Beacon Station operating on 4m, 2m and 70cm; the award of the G5RV Trophy to Mr P. K. Blair, G3LTF, for his outstanding work in the field of moonbounce communications (*V.H.F.*); the results of the Second 432 Mc/s Contest and the Second 1296 Mc/s Contest (*V.H.F. Contests*), and ascertaining if there was a group in the UK who could design and construct an *OSCAR* Satellite (*Scientific Studies Committee*).

Membership

The Council elected 210 new members (147 Corporate and 63 Associate) and accepted 21 applications for transfer from the Associate to Corporate grade.

The subscriptions of seven members were waived on the grounds of blindness and disability.

Affiliation

Affiliation was granted to the following:

The Junior Leaders' Regiment Royal Engineers' Radio Club.
Lowland Royal Signals Amateur Radio Club.
National Radio Club.
Greenock and District Amateur Radio Club.
The University of Kent at Canterbury Radio Club.
Glasgow University Radio Club.

Constitution of Committees for 1967

The Council approved invitations to be sent to members who would serve on Committees of Council for 1967 (reported on page 112 of the February BULLETIN).

Honorary Organizers for 1967

The Council confirmed the following appointments:

QSL Manager.
V.H.F. Manager.
Certificates Manager.
Slow Morse Practice Transmissions Organizer.
Film Library Curator.
Recorded Lecture Library Curator.
Colour Slides Curator.

(Reported on page 112 of the February BULLETIN).

Public Relations

The Council accepted an offer of assistance for an initial period of one year. (Reported on page 194 of this issue.)

A Brief Report on the January 1967 meeting of Council

Society Membership

The Council considered figures submitted at the Annual General Meeting and also results of a Questionnaire sent to members whose subscriptions were outstanding. It is intended to make a major effort to attract new members during 1967.

Aerial Masts and Property Valuation

Following representations from members, the Council approved a decision to obtain the opinion of a QC.

London S.S.B. Dinner

The Council accepted with thanks an offer of space in the Trade Exhibition to be held in conjunction with the above.

Region 10 ORM

The Council accepted an offer to hold an Official Regional Meeting at Cardiff University on 16 September, 1967.

" History of the Society "

Following submission of the final section by Mr Clarricoats, it was decided to proceed with the production of this book.

IQSY

It was reported that the Royal Society had asked the RSGB to submit two reports for inclusion in the Final UK Report on the IQSY.

Minutes of Meetings of Committees

The Minutes of the following Committee Meetings were received as reports: Technical Committee (17.11.66), Exhibition Committee (25.11.66), V.H.F. Committee (5.12.66), Mobile Committee (6.12.66), IARU Working Group (7.12.66), V.H.F. Contests Committee (7.12.66), Membership and Representation Committee (9.12.66), Scientific Studies Committee (12.12.66), Mobile Committee (4.1.67).

The Council was in session for four hours.

RAEN News **(Continued from page 191)**

RESULTS OF 1966 RAEN RALLY

Transmitting

G3MBQ	95	G3NHU	31
G2AVC	87	G3VK	23
G3VOU	73	G3NUP	22
G3HRK	66	G3SEM	19
G3GOX	50	GW2OP	16
G3PXR	49	G3TZK	16
G3UJS	40	G3TPJ	11
G3HPR	36	G3LQI	2
G6ZG	35		

Receiving

A3461, S. Black 61
A4575, K. Fisher 41

Group Award

Manchester	10·4
Norfolk	6·8
Surrey	6·4
Essex	1·5

Awards will be presented to the winners in each section. The group placing was obtained, incidentally, by dividing the total points of participating group members by the number of group members officially registered on 1 October, 1966.

CLUBROOM

A Monthly Survey of Club and Group Activities

For further information on membership or the activities of a particular club, application should be made to the person whose call-sign is indicated at the end of the item. Full addresses may be obtained from the RSGB Amateur Radio Call Book.

During January, publicity was given through the medium of GB2RS to the formation of a South-East V.H.F./U.H.F. Group. The inaugural meeting took place as scheduled on 27 January with an attendance of 53. Following the ceremonial functions which must precede any venture such as this RSGB V.H.F. Manager, Geoff Stone, G3FZL, talked on v.h.f. technique with particular reference to field effect transistors, overlay transistors and varactors.

The next meeting of the Group will be on 17 March when G3NOX/T will lecture through the medium of Amateur Television.

Our comments last month on the format of Clubroom had some favourable effect on contributions. One Secretary did, however, question our action of emphatically laying down the format of both Clubroom and Forthcoming Events, and then publishing examples which contradicted the rule. Our reason: In fairness to clubs and societies who had taken the trouble to prepare copy for Clubroom, but who are not familiar with the requirements, we decided to continue publishing contributions contrary to format, for a while at least. As mentioned last month Clubroom should, in general, contain reports of past events while future programmes are published in Forthcoming Events, copy for which should be submitted to your Regional Representative and not RSGB Headquarters.

Barnsley DARC held its annual Dinner-Dance on 21 January when over 80 members and friends attended. Thanks are due to P. Carbutt, G2AFV, T. Malkin, G5IV, R. Smith, G3DHU J. Walker, G3GNK, H. Eyre, G5KM and Mrs. W. Williams for their services during the proceedings. *G3GNK.*

Basingstoke ARC will be meeting in the Immanuel Hall, Wote Street, Basingstoke, at 7 p.m. on Saturday, 11 March, to hear the second part of a talk by Graham Roper, G8AKM, on Transistor Practice in Amateur Radio. No one who heard his first talk will wish to miss the second. Visitors will be most welcome. *G3CBU.*

South Birmingham RS met in January when arrangements were made for the forthcoming National Field Day. *G3OHM.*

Bristol RSGB Group has moved to a new Headquarters in Transport House, Victoria Street. At the last meeting discussion centred around regulations for NFD and arrangements for the Longleat Mobile Rally in June. *G5UH.*

Cambridge DARC held its Annual Dinner at the University Arms Hotel, Cambridge, on Friday, 20 January, when RSGB President Mr A. D. Patterson, GI3KYP, was Guest of Honour. Before nearly 50 members and friends the Granfield Trophy was awarded to Mr A. D. Wiles for his work with Amateur Television. *G5BQ.*

Chiltern ARC reports the success of its Top Band phone contest held on 4 December. The Transmitting Trophy was awarded to the President, G5WW, with the SWL Trophy going to Martin Arnold. On 26 January, club president G5WW talked on " Some Unusual Uses of Radio." *G3UJK.*

Cornish RAC publish monthly an ambitious Magazine entitled the " Cornish Link," but as now seems a common story, the Editor is facing apathy on the part of members. Perhaps they have been spoilt with contents in the past. However, it has now reached the stage where, out of a total membership of over 100, only *one* member contributed copy for the February issue. A good magazine of this type adds great prestige to a Society and provides a service to members. But it should not be forgotten that the Society proper is a group of enthusiasts known as members and that the service the Society provides is, in fact, a service by members to members.

Crystal Palace DRC met on 20 January when Charlie Newton, G2FKZ talked on the design, construction, testing and use of crystal filters for s.s.b. transmitters. *G3FZL.*

The recently formed **Culcheth ARC** held a full programme of events during February which included a Junk Sale, a trip to Winter Hill Television Transmitting Station and lectures on aerials and s.s.b. by G3FGI and G3SAY respectively. It is hoped that the club constructed 70 Mc/s transmitter worked well in the First 70 Mc/s Contest held on 12 February. *G3VPX.*

The South East V.H.F./U.H.F. Group got off to a good start with an attendance of 53 members. Among those present were l. to r. G4IB, G2JF (Chairman), G2IC, G2DCG, G5MR, and G3BHW.

Photo by G3DAH

East London RSGB Group met on Sunday, 15 January, when after a short business meeting, largely devoted to discussion on two awards available in the district, Brian Watling, G3RNL, gave a useful talk on the theory and practice of s.s.b. It is difficult to determine whether the unconverted were influenced, but there was apparently definite signs of interest among members present. One of the awards mentioned is the Five Acker Award, in memory of a Past President of the RSGB, G5AR. Any member interested in further information should contact G2ABC. *G2ABC.*

Edgware DRS held an enjoyable film show in January, and owing to many requests a further presentation is being convened for the March meeting. The club's Top Band net is still held on Wednesdays on 1875 kc/s at 21.00 GMT. *G3FKI.*

Grafton RS presented the tenth " WALT Award " at a meeting on 20 January. The winner on this occasion was Bill Bailin, G3NOZ, a former Grafton officer and founder member of the Paddington Society. One week later on 27 January, G3SJE presented an interesting talk and demonstration on Oscilloscopes. Earlier in the month vigorous committee meetings were held arranging, among other projects, the Grafton Top Band Contest (see page 190). *G3SIL.*

Harlow DRS met on 17 January when G3VCH spoke on the Cannon Ball s.s.b. exciter and a home built linear. At a committee meeting, five new members were elected and the date of the Harlow Mobile Rally fixed for 24 September, provided this does not clash with another major event. *G3TOF.*

The G2DAF transmitter was the subject of a talk given by G3TEU on 13 January to a meeting of the **Hull & DARS.** On 20 January, G3FCY discussed a prototype 2m converter which it is hoped will become a club project to be built during " Workshop " nights. *G3MVO.*

Ipswich RC continues to meet on the last Wednesday each month at the Red Cross Headquarters, Gippeswyk Hall, Ipswich. On 29 March " our tame audio man talks about amplifiers (we're trying to get him to call them modulators!) and on 26 April will be the dreaded AGM, when there's a fair chance of the Committee being elected *en bloc* if we're not careful " as the club secretary put it! *G3UJR.*

Leyton ARS now meets *weekly* on Tuesdays at 7.30 p.m. in Leyton Senior Institute, Essex Road, London, E10.

Lichfield ARS held its Annual Dinner-Dance at the Bowling Green Hotel on 3 February when 140 members and friends attended. Looking to the future on 6 March its AGM will be held at the Swan Hotel, Lichfield. *G3VIQ.*

Liverpool University ARS entered the RSGB First 144 Mc/s C.W. Contest on 29 January from a unique QTH 150 ft. above ground level on top of the University Physics Tower. Power: 150 watts input to a cool 4CX250B. For the lower power section GW3VXK entered from a mountain in North Wales. The team obviously do not suffer from vertigo! *G3VZK.*

The **Lothians Radio Society** recently enjoyed two first class technical lectures. A representative of Hewlett Packard Ltd. spoke about the precision electronic measuring equipment which the firm manufactures with some interesting examples of oscilloscopes, signal generator and digital frequency counter. At a subsequent meeting two Society members spoke on RTTY. During the evening a punch tape printed out a picture of the late President Kennedy. *GM3PSP.*

Mansfield ARS continues to meet at the New Inn, West Gate, Mansfield on the first Friday of each month. *G8HX.*

Midland ARS did not meet during February as it operated a station from the Birmingham Boat Show using the call GB3BBS. On 21 March, W6KSD will give a lecture on Parametric Amplifiers entitled " You too can make them." *G6CC.*

Northampton SWRC have, after 18 years at Duke Street, moved to Kingsthorpe Community Centre, Kingsthorpe Hall, Northampton. Work is proceeding with the installation of transmitters on all bands up to 2m, with meetings held on Thursdays at 7 p.m., when visitors are always welcome.

Northern Heights ARS meet during January when G6EKE/T lectured on Amateur Television followed later by a talk on s.s.b. power measurement. As a result of meetings like these the Honorary Secretary was pleased to announce an ever-increasing membership. The Secretary also announced a new licensee; this time an XYL, G3VZB. *G3MDW.*

Purley DRC will, in addition to the usual informal meeting on the first of the month, have a Junk Sale on 17th. Over 20-21 May a full dress rehearsal for NFD is scheduled. *G3FTQ.*

Saltash DARC reports well attended club meetings during the past two months, with several interesting talks. The most successful was by BBC Newsreader Joe Perkelly, who is well known in the West, who talked on 13 January on tape recording and quality reproduction. On 24 January a series of Mullard films was presented. *G2DFH.*

During January the **Stratford ARC** heard an RSGB Tape entitled " Electronic Music," and although members found the techniques interesting the finished product was not everyone's idea of music! Another meeting in January was scheduled as an NFD discussion, and went very smoothly much to the surprise of those who expected a daggers-drawn argument. In no time everyone was in agreement and the club is now waiting for the Treasurer's go ahead to assemble the new equipment. Aspiring NFD operators may be encouraged by a tape lecture to be played in March entitled " The Human Machine as an Radio Operator." *G3RPJ.*

At the January meeting of the **Torbay ARS** members heard Mr W. D. Jones, G3BBF talk on the RAF Search and Rescue Organization. The February meeting was devoted to judging entries for the Senior and Junior construction Cup entries. Later this month, on the 11th, the Annual Dinner and Social Evening will be held. *G3NJA.*

This year **Verulam ARC** is making no special efforts to increase membership, although, of course, new members will always be welcome. Instead the committee want to see more of their existing members and have a figure of about 75 in mind. *G3LXP.*

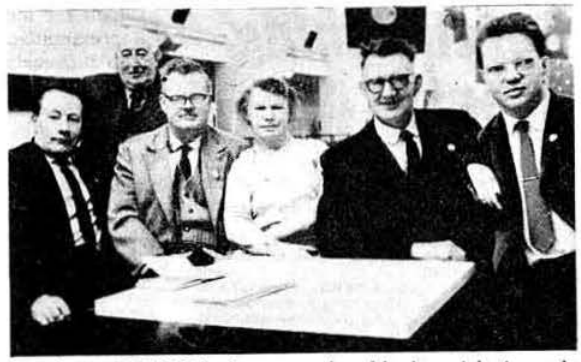
Mid Warwickshire ARS is driving for more finances and is appealing for junk for their bi-monthly sale in aid of this cause. A Mullard film show is planned for 13 March.

As with all other Societies **Wirral ARS** requires *money* to function, so how about the 20 or so members still owing subs paying up! It's your club after all. Considerable space is given in the February newsletter to hotting up the Marconi CR150/4 Communications receiver; a useful supplement to any newsletter. *G3PPE.*

Wolverhampton ARS members should now have recovered from their successful binge on 2 January. New year parties are generally good and this one was enjoyed by all. On 16 January a talk by G2YM on the Old Times apparently raised a few eyebrows of junior members. *G3UBX*

East Worcester RG met in January for a lecture by G5SS on TVI, who methodically went through its prevention and cures. At the February meeting the AGM took place and the following extract from a letter submitted by G3HCT should be food for thought to other club committees.

" The AGM will be held in a private room at a well known local hostelry, celebrated for its food. It will be followed by a dinner to be attended by YLs and XYLs. This will have two advantages, the food won't wait—so the meeting will not go on and on; secondly the presence of the weaker sex will ensure the business is cleared quickly and without dissention." A sobering thought. *G3HCT.*



Members of RAIBC had a very enjoyable day at last year's RSGB International Radio Communications Exhibition. The group seen in the photo are, l. to r.: Con Scarrott, Bob Squires, Jim Jewiss, Winnie, Ted Gretton and Frank Morphew.

Neighbouring clubs will be the guests of **Yeovil ARC** on 10 March when a talk and demonstration on u.h.f. aerials will be given by G3JMY. *G3TTC.*

York ARS held its AGM 12 January and reported another successful year with high hopes for 1967. *G3HWW.*

Newsletters were also received from **AERE (Harwell) ARC, Coventry ARS, Crawley ARC, Cray Valley RS, Mid Herts ARS North Kent RS, Mid Sussex RS.** and **Swindon & DARC.**

It would be assistance to the compiler of " Clubroom," if reports could be concise, typed double spaced and submitted before the final deadline if at all possible. In handwritten reports, please spell unusual words in block capitals.

Deadline for the **April** issue is **10 March** and for the **June** issue **7 April.**

Written Long Ago

" At 6.50 on the memorable night of November 13, 1924, I heard 3BQ's call-sign from Australia and for the first time in history two-way wireless communication was established between Britain and that country. I am now endeavouring to explore the possibilities of low power communication on a wavelength of 20 metres. This is an entirely new field of research and although we are experiencing considerable difficulty in obtaining permission from the Post Office I think it will be safe enough to go ahead in a few weeks' time. " My belief is that on a wavelength of 20 metres we will be able to maintain two-way communication with Australia and New Zealand at any hour of the day or night and not be limited to the periods of dawn and twilight as we are at present."

Mr Ernest J. Simmonds, G2OD, in an interview with a representative of The Sun *of Australia, 19 March, 1925. (G2OD was the first British amateur to work Canada and Australia on telegraphy and the first to work Australia on telephony).*

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the **first of the month** preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Standing instructions cannot be accepted.

REGION 1

Ainsdale (ARS).—8, 22 March, 5 April, 8 p.m., 77 Clifton Road, Southport.

Allerton (Liverpool) (SRHS).—Thursdays, 8 p.m., 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

Ashton-under-Lyne (AUL & DARS).—Fridays, 7 p.m., Rooms F52 and F53, Ashton College, Beaufort Road.

Blackburn (ELARC).—2 March (Film Show AEI Films), 6 April (Constructional Competition), 7.30 p.m. YMCA, Limbrick, Blackburn.

Blackpool (B & FARS).—Every Monday, 8 p.m., Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 p.m.

Bury (B & RRS).—14 March, 11 April, 8 p.m., Old Boars Head Hotel (private room), Crompton Street.

Chester (C & DARS).—Tuesdays, 8 p.m., YMCA. Except first Tuesday in each month.

Crewe & District.—6 March, 3 April, 8 p.m., Earl of Crewe Hotel, Nantwich Road.

Eccles (E & DRC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft. Every Thursday Club Top Band net 20.30 hours.

Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

(ULARS).—9 March, 7.30 p.m., Students' Union, a Bedford Street North, Liverpool 7.

Macclesfield (M & DRS).—14, 28 March, 11 April, 8 p.m., The George Hotel, Jordangate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.

(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

Morecambe.—1 March, 5 April, 125 Regent Road.

Preston (PARS).—14 March, 11 April, 7.30 p.m., St. Paul's School, Pole Street.

St. Helens (SES).—7, 21 March, 4 April, 7.30 p.m., IVS Centre, 55 College Street.

Southport (SRS).—1 March (RSGB Tape Lectures "2 metres" and "Receivers"), 15 March ("Interference" by GPO official). Other meetings Wednesdays 8 p.m. and Sundays 4 p.m., The Esplanade.

(73 S.S.B. Society).—Tuesdays (Commencing with talk on the RAE Syllabus), 8 p.m., 73 Avondale Road North, Southport.

Stockport (SRS).—8 March (Talk and demonstration on "S.S.B." by Dr David Last), 8 p.m., Blossoms Hotel, Buxton Road, Stockport.

Warrington-Culcheth (CARC).—Fridays, 7.30 p.m., The Harrow Inn, Culcheth.

Wirral (WARS).—1 March ("160 Metre Aerials" by G3PPE), 15 March (Junk Sale), 5 April (Talk by H. Schroeder), 8 p.m., Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Barnsley (B & DARC).—10 March (Visit to be arranged), 24 March (No meeting), 7.30 p.m., King George Hotel, Peel Street.

Bradford (BRS).—21 March (AGM), 7.30 p.m., Bradford Technical College, Great Horton Road, Bradford.

Hull (H & DARS).—3 March (Morse Code Competition), 10 March (Workshop—work on current projects), 17 (Discussion on NFD), Thursday, 23 March (Society transmitter on the air), 8 p.m., 592 Hessle Road, Hull.

Northern Heights.—15 March ("RTTY," by David Pratt, G3KEP), 29 March (Discussion on NFD), 7.45 p.m., Sportsman's Inn, Ogden, Halifax.

Scarborough (SARS).—Thursdays, 7.30 p.m., rear of 3 Trinity Road, Scarborough.

York (YARS).—16 March (Film—"Ship to Shore"), 8 p.m., 61 Micklegate, York.

REGION 3

Birmingham (MARS).—21 March ("Parametric Amplifiers, you too can build one," by A. Szerlip, G5ABD/W6KSD), 7.45 p.m., Midland Institute, Margaret Street.

Bromsgrove (B & DARC).—Second Friday in the month, 8 p.m., Co-op Hall.

Cannock (CCARS).—First Thursday in the month, Bridgtown Social Club, Walsall Road, Cannock.

Dudley (DARC).—10 March (Lecture by T. P. Douglas, G3BA), 8 p.m., Art Gallery, Dudley.

Mid-Warwickshire (MWARS).—13 March (Film Show), 27 March ("Scottish Islands," Slides and Talk by Mr Mackenzie), 8 p.m., 7 Regent Grove, Leamington Spa.

Redditch (EWRC).—9 March (J-Beam lecture), 8 p.m., The Old People's Centre, Park Road, Redditch.

Salop (SARS).—9 March ("Commercial Aspects of VHF/UHF Mobile Radio Systems," by G. Barnes, G3AOS), 23 March ("Sale of Surplus Equipment"), 7.30 p.m., Old Post Office Hotel, Milk Street, Shrewsbury.

Stratford (S-U-A & DRC).—9 March ("The Human Machine as a Radio Operator," RSGB Tape Lecture), 23 March (Film Show), 8 p.m., Halls Croft, Old Town, Stratford.

Wolverhampton (WARS).—6 March ("D/F" by G3GKZ of Slade Radio Society), 8.15 p.m., Golden Lion, 20 March (Discussion on QSL Cards), 8.15 p.m., Stockwell Road, Tettenhall.

Worcester (W & DARC).—Every Saturday (Informal), 8 p.m., 35 Perdiswell Park, Droitwich Road, Worcester.

REGION 4

Derby (D & DARS).—1 March (Surplus Sale), 8 March (Open Evening—Committee Meeting), 19 March (Amateur Television—Lecture and demonstration), 22 March ("The Field Effect Transistor," by D. Foulds), 29 March ("Aircraft plotting by radio," by D. Stanley), 7.30 p.m., Room No. 4, 119 Green Lane, Derby.

Grimsby (GARS).—9 March and 23 March (Informal), 8 p.m., Grimsby Model Engineers Club Room, Fletchers Yard, Wellowgate, Grimsby.

Heanor (H & DARS).—7 March (Constructors' Exhibition), 14 March (Sale of Surplus), 21 March (Annual Dinner), 28 March (Closed), 7.30 p.m., Room No. 14, South East Derbyshire College of Further Education, Ilkeston Road, Heanor.

Leicester (LARS).—Mondays (7.30 p.m., Slow Morse Practice), Sundays (10.30 a.m., Informal), Club Rooms, Old Hall Farm, Braunstone Lane, Leicester.

Loughborough (LARC).—Fridays (7.30 p.m., Informal), Club Room, Bleach Yard, Wards End, Loughborough.

Mansfield (MARS).—3 March (AGM), 7.30 p.m., The New Inn, Westgate, Mansfield.

Melton Mowbray (MMARS).—16 March ("Tape Recording,"—Recorded Lecture by F. C. Judd, A.Inst.E., G2BCX), 7.30 p.m., St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.

Newark (NSWC).—Mondays, Thursdays, 7.30 p.m., The Hall, Guildhall Street, Newark.

Nottingham (ARCN).—Tuesdays, Thursdays, 7.30 p.m., Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham.

Peterborough (P & DARS).—Fridays (8 p.m., Informal), Old Windmill, behind The Peacock Inn, London Road (opposite Murkitts Garage).

Worksop (NNARS).—Tuesdays (RAE Class), Thursdays (Lecture), 7.30 p.m., Club Room, 13 Gateford Road, Worksop.

REGION 5

Cambridge (C & DARC).—3 March (AGM). Fridays 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

(CUWS).—Alternate Tuesdays during University Term, 7 March (AGM), Psychology Department, Downing Site.

Luton (L & DARS).—7 March ("Power Supplies," demonstration by G3TUI), 14 March ("Spring Sale," Messrs Hannington), 21 March ("S.S.B." by a visiting speaker). 8 p.m., Tuesdays at ATC Headquarters, Crescent Road, Luton, Bedfordshire. C.W. and Elementary Theory 7.30 p.m. each week.

Shefford (S & DARS).—2 March (NFD Planning and Junk Sale), 9 March (Film Show on Oscilloscopes), 16 March (Any Questions), 21 March (Visit to Luton Club), 23 March (NO Meeting), 30 March (Talk by Texas Instruments).

March (M & DRAS).—Tuesdays 7.30 p.m., rear of Police Headquarters, High Street, March, Cambridgeshire.

Royston (R & DARC).—Wednesdays 8 p.m., Manor House, Melbourn Street, Royston, Hertfordshire.

REGION 6

Cheltenham RSGB Group.—2 March ("Micro electronics"), 8 p.m., Great Western Hotel, Clarence Street.

Gloucester (GARS).—9, 23 March, 7.30 p.m., Lambs Inn, Market Parade.

Reading (RARC).—14 March ("Fiddling Phasing Rigs," by G2FQR), 28 March ("Crystal Filters"—a practical demonstration by G5XB), Contact G8APH.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—21 March ("Linear Amplifiers," by G3CCD), 7.30 p.m., Chiswick Trades and Social Club, 66 High Road, Chiswick.

Ashford (Middx.) Echelford (ARS).—11, 25 March, 7.30 p.m., Links Hotel, Ashford.

Bexley Heath (NKRS).—4 March (Annual Dinner), 9, 23 March, Meetings, 7.30 p.m., Congregational Church Hall, Chapel Road, Bexley Heath.

Chingford Group.—Alternate Fridays, 10, 24, March. Contact G3EHD, SIL 5642.

(SRC).—Fridays (except first in month), 8 p.m., Friday Hill House, Simmons Lane, Chingford, E4.

Croydon (SRCC).—21 March, 7.30 p.m., Blue Anchor, South End.

Dorking (D & DRS).—14 March (Informal Meeting), 8 p.m. Wheatsheaf, 28 March (Formal Meeting), 8 p.m., Star and Garter, Dorking.

Ealing (E & DARS).—Tuesdays, 7.30 p.m., Northfields Community Centre, Northcroft Road, Ealing, W13.

East Ham.—First and third Tuesdays, 7.30 p.m., 12 Leigh High Road, East Ham.

East London.—Sunday, 19 March ("V.H.F. Discussion,' conducted by A. J. Reynolds, G3NNK), 2.30 p.m., Wanstead House, The Green, Wanstead, E11.

East Molesey (TVARTS).—First Wednesday each month, Prince of Wales, Bridge Road, East Molesey.

Edgware (E & DARS).—13 March (Film Show), 27 March (No meeting), 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware, Middlesex.

Gravesend (GRS).—Third Wednesday each month, 7.30 p.m., RAFTA Club, Overcliffe Road.

Guildford (G & DRS).—10, 24 March, 8 p.m., Guildford Model Engineering Society, in Stoke Park.

Harlow (DRS).—Tuesdays and Thursdays, 7.30 p.m., Mark Hall Barn, First Avenue.

Harrow (RSH).—Fridays, 3 March (Junk Sale), 10 March (Practical Morse, RAE), 17 March (Film Show), 24 March (Easter, No Meeting), 8 p.m., Roxeth Manor School, Eastcote Lane.

Havering (H & DARC).—8, 22 March, Romford.

Holloway (GRS).—Mondays (RAE), 7 p.m., Wednesdays (Morse), 7.30 p.m., Fridays (Club), 7.30 p.m., Montem School, Hornsey Road.

Hounslow (HADRS).—9, 23 March, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 103 Heath Road, Chadwell Heath.

Kingston (K & DARS).—Second Wednesday each month, 8 p.m., YMCA, Eden Street.

Leyton & Walthamstow.—7, 21 March, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E10.

London U.H.F. Group.—2 March, Whitehall Hotel, Bloomsbury Way, Holborn, WC1.

Loughton.—10, 24 March, 7.30 p.m., meetings alternate Fridays, Loughton Hall (Nr. Debden Station).

Maidenhead (M & DARC).—21 March, 7.30 p.m., Victoria Hall, Cox Green, Maidenhead.

New Cross.—Wednesdays and Friday, 8 p.m., 225 New Cross Road, SE14.

Norwood and South London (CP & DRS).—18 March, CD Centre, Catford, London, SE6.

Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, W2.

Purley (P & DRC).—17, 31 March, 8 p.m., Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.

Reigate (RATS).—8 March, 7.30 p.m., George and Dragon, Cromwell Road, Redhill.

Romford (R & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road.

Scouts (ARS).—16 March, 7.30 p.m., Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS).—First Thursday every month 7.30 p.m., Congregational Church Hall, Court Road, Eltham.

Slough (SDR Group).—First Wednesday every month 8 p.m., United Services Club, Wellington Street.
South London Mobile Club.—11 March (Talk), 25 March (Easter, no meeting), Clapham Manor Baths, SW4.
Southgate & District.—9 March, 7.30 p.m., Parkwood Girls School (behind Wood Green Town Hall).
St. Albans (VARC).—15 March (QUIZ, Verulam v. Harrow), 7.30 p.m., Cavalier Hall, Watford Road, St. Albans.
Sutton (S & CRS).—8 April (Annual Dinner and Dance), The Woodstock Hotel, Sutton, Surrey. Tickets 27s. 6d. from G3DCZ.
Sutton & Cheam (SCRS).—21 March, 8 p.m., The Harrow Inn, High Street, Cheam.
Welwyn Garden City (Mid Herts ARS).—9 March (Annual Constructors' Competition and a GPO Film "Ship to Shore"), 8 p.m., Vineyard Barn, Digswell Road.
Wimbledon (W & DRS).—10 March, 8 p.m., Community Centre, St. George's Road, Wimbledon, SW19.
Wembley (CECARS).—Every Thursday, 7 p.m., Sports Club, St. Augustins Avenue, North Wembley. This club is now open to non-employees of GEC by invitation. Telephone: ARNold 1262 first.

REGION 8

Crawley (CARC).—8 March (Informal. For details contact G3FRV), 17 March (Annual Dinner at the Crawley Forest Hotel, 7.30 p.m. for 8 p.m.), 22 March ("Curing BCI and TVI," by the GPO Radio Branch), 8 p.m. Trinity Congregational Church Hall, Ifield.
Haywards Heath (M-SARS).—1 March "Informal," details from G3RXJ, 15 March (Sale of Surplus Equipment), 8 p.m., Lindfield Primary School, Nr. Haywards Heath.

REGION 9

Bath.—17 March, 7.30 p.m., RNR Training Centre, James St. West, Bath.
Bristol.—24 March (AGM), 7.30 p.m., Transport House, Victoria Street, Bristol 1.
(BARC).—Mondays and Thursdays, 7.30 p.m., 43 Ducie Road, Barton Hill, Bristol 5.
Burnham-on-Sea (BoSARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, Near Camborne.
(CRAC VHF Group).—Third Thursday in each month, 7.30 p.m., The Coach and Horses, Ryder Street, Truro.
Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.
Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.
Saltash (S & DARC).—Alternate Fridays, 7.30 p.m., Burraton Toc H Hall, Warraton Road, Saltash.
South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.
Taunton.—Alternate Thursdays, 7 p.m., Lecture Theatre, Taunton Technical College.
Torquay (TARS).—Last Saturday in each month, 7.30 p.m., Club HQ, Belgrave Road, Torquay.
Wells (WARS).—Mondays from 8 p.m., EMIE (Wells) Sports and Social Club, Chamberlain Street, Wells, Somerset.
Weston-super-Mare.—First Friday in each month, 7.30 p.m., Technical College (Wyndham Hall).
Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Blackwood (ARC).—Fridays, Lecture programme with section devoted to instruction for RAE, 7.30 p.m., Blanche Cottage, off High Street, Blackwood, Mon.
Cardiff RSGB Group.—13 March (Film Show), 7.30 p.m., TA Centre, Park Street, Cardiff.

REGION 11

Llandudno (CVARC).—16 March (Visit to local factory). Details from GW3RUA.

REGION 13

Edinburgh (LRS).—9 March (Visit to Turnhouse), 23 March ("Amateur Operation in the States," by Philip Pisar, W0GMT), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 14

Ayrshire (AARG).—8 March, 22 March, 7 p.m., Seaforth House, Seaforth Road, Ayr.
Auchenharvie (A & DARS).—2, 7, 9, 14, 16, 21, 23, 28 and 30 March, 7.30 p.m., Auchenharvie Community Centre, Stevenston.
North Ayrshire (NAARC ATC).—5 March, 7.30 p.m., Ardrossan ATC, The Academy, Ardrossan.
Glasgow RSGB Group.—10 March, 24 March, 7.30 p.m., Christian Institute, Bothwell Street, Glasgow.
University (GURC).—8 March, 7.30 p.m., Engineering North Building, University of Glasgow, Glasgow.
Greenock (G & DARC).—5 March, 19 March, 7.30 p.m., Arts' Guild, Campbell Street, Greenock.
Motherwell RSGB Group.—19 March, 7.30 p.m., Carfin Hall, Motherwell Road, New Stevenston, by Motherwell.

REGION 15

Belfast and District RSGB Club.—Third Wednesday in each month, 8 p.m., War Memorial Building, Waring Street, Belfast.

REGION 16

Basildon (BDARS).—Details from G3IJB.
Chelmsford (CARS).—4 April, (Radio Quiz versus Basildon), 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
Great Yarmouth (GYRC).—Fridays, 7.30 p.m., The Manager's Office, the Old Power Station, Swanstons Road, Great Yarmouth.
Ipswich (IRC).—29 March (Amplifiers, talk by J. Rutherford), 7.30 p.m., Red Cross HQ., Gippeswyk Hall, Ipswich.
Norwich (NARC).—Meetings every Monday at Old Lakenham Hall, Mansfield Lane, Norwich.

Civil Service Radio Society—14 March, 1967
"Kit Construction and Hi-Fi Equipment"
Lecture by D. A. Smith and G. J. Stone of Daystrom Ltd., 6.30 p.m., Science Museum, South Kensington, London; entrance through main door or staff door. Tickets available from G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.

LOOKING AHEAD

7 May.—Thanet Mobile Rally.
13 May.—International V.H.F./U.H.F. Convention.
18 June.—ARMS Mobile Rally.
25 June.—Longleat Mobile Rally.
9 July.—Gilwell Park Mobile Rally.
16 July.—Worcester Mobile Rally.
23 July.— Cornish Mobile Rally.
24 September.—Harlow Mobile Rally.
26 September.—Electronics, Instruments, Controls and Components Exhibition and Convention, Belle Vue, Manchester.

NEW BOOKS

TRANSISTORS FOR TECHNICAL COLLEGES. By L. Barnes, M.Sc., Tech., A.M.I.E.E. Published by Iliffe Books Ltd. 194 pages, including 87 diagrams. Size: 8¾ in. × 5¼ in. Price 42s (casebound). 25s. (limp covers).

This book has been written to meet the criticism that the material in Electrical Engineering courses is usually presented without regard to considerations of practical circuit design. Devices, which include such applications as the Zener diode and the thyristor as well as transistors, and circuits are treated therefore largely from the design aspect. Extensions to the work which might impede the easy flow of the argument have been included as appendices. Both letter and graphical symbols used conform to the respective British Standards. Symbols, with definitions, are listed at the beginning of the book.

The practical treatment can be seen from the chapter headings: Fundamentals of Crystal Diode and Transistor Action; The Transistor in Practice; Approximate Design of Linear Circuits; Parameters and Equivalent Circuits for Low Frequencies; Frequency Effects; Switching Circuits; Experiments. Nine appendices cover: Data including Limiting Values for Mullard *P-N-P* Junction Transistor OC71; Voltage and Current Generators; Stabilization of Operating Point; Gain and internal Resistance Formulae in Terms of Low-Frequency T-Parameters; Gains and Internal Resistances in h-Parameters; Relationships between H- and T-Parameters; Commonly used Types of Feedback; More Semiconductor Devices; Limiting Ratings.

TRANSISTOR CIRCUIT DESIGN AND ANALYSIS By E. Wolfendale, B.Sc. (Eng.), M.I.E.E. Published by Iliffe Books Ltd. Size: 8¾ in. × 5¼ in. 292 pages, including 169 diagrams. Price: 70s.

This book provides engineers, physicists and undergraduates with a comprehensive introduction to circuit design and analysis and shows how theoretical analysis of circuits and networks can be carried out to enable the final equations to be used in practical circuit design. For the benefit of the older engineers and the younger undergraduates, the more advanced methods of analysis have been omitted, but the more mathematically minded will find it relatively easy to translate the procedures given to make them suitable for their own methods of analysis.

Throughout the book the theory has been worked out from first principles for the equivalent circuits of the transistor. For most of the standard circuits required for electronic design, the theoretical equations have then been used in a practical design example which has been worked out to give the component values required for the design. The example designs given are not intended to be optimum designs and, in many cases, do not take into account spreads and tolerances. They have been chosen to demonstrate important points in the use of a theoretical analysis for practical design. The designs use hypothetical transistors, the characteristics of which are specified. They will work with transistors having the same characteristics but it should be emphasised that this book is not intended as a handbook of worked out designs. It provides, however, sufficient circuits around the transistors he wishes to use.

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28 LITTLE RUSSELL STREET, LONDON, WC1

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Guide to Amateur Radio (Twelfth Edition)	5/9
S.S.B. Equipment	3/–
Communications Receivers (Second Edition)	3/–
Morse Code for Radio Amateurs (Fourth Edition)	2/–
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RADIO AMATEURS' EXAMINATION

FRIDAY, 12 MAY, 1967 — 6.30 p.m.

COLLEGE OF PRECEPTORS
BLOOMSBURY WAY
LONDON, WC1

Applications to sit the examination at this centre should be sent to the General Manager, Radio Society of Great Britain, 28 Little Russell Street, London, WC1. The fee, £1 10s. for RSGB members, or £2 for non-members, should be enclosed. Remittances must be made payable to the Radio Society of Great Britain.

Applications received after 6 March can be accepted, but must be accompanied by an additional fee of £2. The closing date for receipt of such applications is 27 February, 1967

K.W. Corner

Dartford, Kent

Dear Reader,

During the month, I have had many letters showing surprise that the Sommerkamp FT 100, FL 200B, FR 100B and FL 1000 are made in Japan. It has now been reported that the production of the FT 100 Transceiver in Japan has been stopped and the model discontinued. I have also received many encouraging letters about buying British equipment and the excellent value of KW equipment. One customer pointed out that you can buy TWO KW 2000A Transceivers for the price of one Brand "X" made in USA. I liked another customer's comments in the space provided on our guarantee registration card when he returned his card for a KW 201 Receiver—" Excellent value for money, stable as a rock, am delighted with performance on all bands " (Thank you G3STM).

The matching transmitter for the KW 201 Receiver is the KW Vespa about which we have many favourable comments. For those who have not already heard, the lucky winner of the KW Vespa contest held last November was 9M2BS in Malaysia. We wish him plenty of DX. For those who require a little more power from the " Vespa " the 6146B in place of the 6146 will give almost 20% more output without modification to the equipment. Carrying out this replacement will not, of course, make the guarantee null and void. We are, however, concerned at the RSGB regulations for NFD 1967 recently published. Limiting the plate dissipation figure for the PA valve in the transmitter to 13.5 watts precludes the use of a KW 2000 for the contest, which was used by so many stations last year, with suitable power supply modifications. Unless the 6146 is replaced by another slightly smaller valve the KW 2000 cannot be used in this year's contest, nor can those old faithful Club transmitters with an 807 PA. To meet the regulations a 2E28 could be used (although this can still be run at 50 watts D.C. input) and at first glance this valve looks to be a direct replacement for the 6146 except for the heater current requirements. I suggest you check with us first about the validity of the guarantee.

A new vertical aerial, covering 10-80 metres without radials, has been put on the market by Hustler (USA). We have a small supply in stock but before recommending them we propose trying one out ourselves. They look good; but that's the kind of people we are—we like to know what we are talking about—it always keeps us one step ahead of our competitors.

Yours faithfully, **ROWLEY SHEARS** Sgd.
Managing Director, G8KW

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